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DRESDEN NUCLEAR POWER STATION
UNITS 1, 2 and 3

Annual Radiological
Environmental Operating Report

1 January through 31 December 2019

Prepared By
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Environmental Services

Exelon Generation®

Dresden Nuclear Power Station
Morris, IL 60450

May 2020

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I. Summary and Conclusions

In 2019, the Dresden Nuclear Power Station calculated a Total Body dose to the nearest resident of 7.18E+00 mRem/yr from all sources of the uranium fuel cycle with a limit of 25 mRem/yr, which is 28.7% of the limit. Dose contributions were from Unit 1, operation of Units 2 and 3, storage tanks, Independent Spent Fuel Storage Installation (ISFSI) pads, C-14, and the neighboring GE Facility. More detailed information can be found in the Dresden 2019 Annual Radioactive Effluent Release Report.

Surface water samples were analyzed for concentrations of gross beta, tritium and gamma-emitting nuclides. Ground water samples were analyzed for concentrations of tritium and gamma-emitting nuclides. No anthropogenic gamma-emitting nuclides were detected. Gross beta and tritium activities detected were consistent with those detected in previous years.

Fish (commercially and recreationally important species), and sediment samples were analyzed for concentrations of gamma-emitting nuclides. No fission or activation products were detected.

Air particulate samples were analyzed for concentrations of gross beta and gamma-emitting nuclides. Gross beta results at the indicator locations were consistent with those at the control location. No fission or activation products were detected.

High sensitivity Iodine-131 (I-131) analyses were performed on weekly air samples. All results were less than the minimum detectable activity for I-131.

Cow milk samples were analyzed for concentrations of I-131 and gamma-emitting nuclides. All I-131 results were less than the minimum detectable activity. No fission or activation products were detected. Food product samples were analyzed for concentrations of gamma-emitting nuclides. No fission or activation products were detected.

Environmental gamma radiation measurements were performed quarterly using Optically Stimulated Luminescent Dosimetry (OSLD). The relative comparison to control locations remains valid.

This report on the Radiological Environmental Monitoring Program conducted for the Dresden Nuclear Power Station (DNPS) of Exelon Generation, LLC covers the period 1 January 2019 through 31 December 2019. During that time period 1,859 analyses were performed on 1,731 samples. In assessing all the data gathered for this report it was concluded that the operation of DNPS had no adverse radiological impact on the environment.

II. Introduction

The Dresden Nuclear Power Station (DNPS), consisting of one retired reactor and two operating boiling water reactors owned and operated by Exelon Generation, LLC, is located in Grundy County, Illinois. Unit No. 1 went critical in 1960 and was retired in 1978. Unit No. 2 went critical on 16 June 1970. Unit No. 3 went critical on 02 November 1971. The site is located in northern Illinois, approximately 12 miles southwest of Joliet, Illinois at the confluence of the Des Plaines and Kankakee Rivers where they form the Illinois River.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Landauer on samples collected during the period 1 January 2019 through 31 December 2019.

An assessment of the station's radioactive effluent monitoring results and radiation dose via the principle pathways of exposure resulting from plant emissions of radioactivity including the maximum noble gas gamma and beta air doses in the unrestricted area, an annual summary of meteorological conditions including wind speed, wind direction and atmospheric stability and the result of the 40CFR190 uranium fuel cycle dose analysis for the calendar year are published in the station's Annual Radioactive Effluent Release Report.

A. Objective of the Radiological Environmental Monitoring Program (REMP)

The objectives of the REMP are to:

1. Provide data on measurable levels of radiation and radioactive materials in the site environs.
2. Evaluate the relationship between quantities of radioactive material released from the plant and resultant radiation doses to individuals from principal pathways of exposure.

B. Implementation of the Objectives

The implementation of the objectives is accomplished by:

1. Identifying significant exposure pathways;
2. Establishing baseline radiological data of media within those pathways;
3. Continuously monitoring those media before and during Station operation to assess Station radiological effects (if any) on man and the environment.

III. Program Description

A. Sample Collection

Samples for the DNPS REMP were collected for Exelon Generation, LLC by Environmental Incorporated Midwest Laboratory (EIML). This section describes the general collection methods used by EIML to obtain environmental samples for the DNPS REMP in 2019. Sample locations and descriptions can be found in Appendix B, Table B–1 and Figures B–1 and B-2. The collection methods used by EIML are listed in Table B-2.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water (SW), ground water (GW), fish (FI) and sediment (SS). Samples were collected from three surface water locations (D-21, D-52 and D-57) and composited for analysis. Control locations were D-52 and D-57. Samples were collected quarterly or more frequently from two well water locations (D-23 and D-35). All samples were collected in new unused plastic bottles, which were rinsed with source water prior to collection. Fish samples comprising the flesh of freshwater drum, smallmouth buffalo, golden redhorse, largemouth bass, channel catfish and common carp were collected semiannually at two locations, D-28 and D-46 (Control). Sediment samples composed of recently deposited substrate were collected at one location semiannually, D-27.

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate and airborne iodine (AP/AI). Airborne iodine and particulate samples were collected at fourteen locations (D-01, D-02, D-03, D-04, D-07, D-08, D-10, D-12, D-14, D-45, D–53, D-55, D-56 and D-58). The control location was D-12. Airborne iodine and particulate samples were obtained at each location using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The air filters and air iodine samples were replaced weekly and sent to the laboratory for analysis.

Terrestrial Environment

Milk (M) samples are typically collected biweekly at one control location (D-25) from May through October and monthly from November through April. Other than D-25, there are no additional milking animals within 10 km (6.2 miles) of the site. All milk samples from D-25 were collected in new unused two gallon plastic bottles from the bulk tank, preserved with sodium bisulfite and shipped promptly to the laboratory. Food products (FL) were collected annually in August at five locations (D-Control, D-Quad 1, D-Quad 2, D-Quad 3, and D-Quad 4). Five sets of samples

were also collected at the on-site garden (D-42). The control location was D-Control. Various types of samples were collected and placed in new unused plastic bags and sent to the laboratory for analysis.

Ambient Gamma Radiation

Each location consisted of two OSLD sets. The OSLD locations were placed on and around the DNPS site as follows:

An inner ring consisting of 17 locations (D-58, D-101, D-102, D-103, D-104, D-105, D-106, D-107, D-108, D-109, D-110, D-111, D-112a, D-113, D-114, D-115 and D-116) at or near the site boundary.

An outer ring consisting of 16 locations (D-201, D-202, D-203, D-204, D-205, D-206, D-207, D-208, D-209, D-210, D-211, D-212, D-213, D-214, D-215 and D-216) approximately 5 to 10 km (3.1 to 6.2 miles) from the site.

Other locations consisting of OSLD sets at the 13 air sampler locations (D-01, D-02, D-03, D-04, D-07, D-08, D-10, D-14, D-45, D-53, D-55, D-56 and D-58).

The balance of one location (D-12) represents the control area OSLD set.

The OSLDs were exchanged quarterly and sent to Landauer for analysis.

B. Sample Analysis

This section describes the general analytical methodologies used by TBE to analyze the environmental samples for radioactivity for the DNPS REMP in 2019. The analytical procedures used by the laboratory are listed in Appendix B Table B-2.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of beta emitters in surface water and air particulates.
2. Concentrations of gamma emitters in ground and surface water, air particulates, milk, fish, sediment and vegetation.
3. Concentrations of tritium in ground and surface water.
4. Concentrations of I-131 in air and milk.
5. Ambient gamma radiation levels at various site environs.

C. Data Interpretation

For the purpose of this report, Dresden Nuclear Power Station was considered operational at initial criticality. In addition, data were compared to previous years' operational data for consistency and trending. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

   The lower limit of detection (LLD) was defined as the smallest concentration of radioactive material in a sample that would yield a net count (above background) that would be detected with only a 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD was intended as a before the fact estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact criteria for the presence of activity. All analyses were designed to achieve the required DNPS detection capabilities for environmental sample analysis.

   The minimum detectable concentration (MDC) is calculated the same as the LLD with the exception that the measurement is an after the fact estimate of the presence of activity.

2. Net Activity Calculation and Reporting of Results

   Net activity for a sample was calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, background variations may result in sample activity being lower than the background activity effecting a negative number. An MDC was reported in all cases where positive activity was not detected. Gamma spectroscopy results for each type of sample were grouped as follows:

   For groundwater, surface water, and vegetation twelve nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140 were reported.

   For fish, sediment, air particulate and milk eleven nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140 and La-140 were reported.

   Means and standard deviations of the results were calculated. The standard deviations represent the variability of measured results for different samples rather than single analysis uncertainty.

D. Program Exceptions

For 2019 the DNPS REMP had a sample recovery rate greater than 99% (1,731 of 1,859 samples collected). Sample anomalies and missed samples are listed in the tables below:

Table D-1 LISTING OF SAMPLE ANOMALIES

Sample Type	Location Code	Collection Date	Reason
AP/AI	D-12	01/04/19	Lower reading for no apparent reason. Timer operating correctly. NOTE: The reading on 01/11/19 shows normal time (167.9 hrs).
AP/AI	D-56	02/02/19	Lower reading of 109.9 hrs during the 8-day collection period possibly caused by power failure due to extremely cold weather. NOTE: On 02/02/19 timer showed 142.01 hrs, normal for 6-day run.
AP/AI	D-10	03/08/19	Lower reading for no apparent reason. Timer operating correctly. NOTE: The reading on 03/15/19 indicated 166.9r hrs (normal).
OSLD	D-201-2	06/28/19	OSLD found missing during quarterly exchange
WW	D-23	06/28/19	New well chosen by station personnel in the proximity of the vacant building. Water collected on 06/28/19.
WW	D-23	08/09/19	Sample not collected. Owner not present, no access to the tape. NOTE: Sample collected on 08/16/19.
AP/AI	D-56	08/09/19	Timer replaced. NOTE: During the 08/16/19 collection, the timer indicated 167.1 hrs (normal)
WW	D-23	10/11/19	Owners departed for winter - all water outlets closed. Station informed and water was collected from neighbor's house.

Table D-2 LISTING OF ODCM REQUIRED MISSED SAMPLES

Sample Type	Location Code	Collection Date	Reason
WW	D-53	01/11/19	Home vacant; water turned off
SW	D-52, D-57	01/25/19	No sample; water frozen
SW	D-52	02/02/19	No sample; water frozen
SW	D-57	02/22/19	No sample; water frozen
SW	D-52	03/08/19	No sample; water frozen
WW	D-23	04/12/19	Home vacant; water turned off
OSLD	D-201-1	06/28/19	OSLD found missing during quarterly exchange
M	D-25	09/20/19	No milk available; cows not milked due to owner injury

Each program exception was reviewed to understand the causes of the program exception. No sampling or maintenance errors were identified

during the reporting period. Occasional equipment breakdowns and power outages were unavoidable.

The overall sample recovery rate indicates that the appropriate procedures and equipment are in place to assure reliable program implementation.

E. Program Changes

There were no program changes in 2019.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were composited or taken weekly and composited for analysis at three locations (D-21, D-52 and D-57). Of these locations only D-21, located downstream, could be affected by Dresden's effluent releases. The following analyses were performed:

Gross Beta

Monthly composites from all locations were analyzed for concentrations of gross beta (Table C–I.1, Appendix C). Gross Beta was detected in 34 of 34 samples. The values ranged from 2.7 to 12.6 pCi/l. Concentrations detected were consistent with those detected in previous years. (Figures C-1, C–2 and C–3, Appendix C)

Tritium

Quarterly composites from all locations were analyzed for tritium activity (Table C–I.2, Appendix C). Two samples at indicator station D-21 was positive for tritium with concentrations of 216 and 484 pCi/L. Two samples at control station D-57 were positive for tritium with concentrations of 638 to 1,850 pCi/L. No samples from station D-52 were positive for tritium. Concentrations detected were consistent with those detected in previous years. (Figures C–4, C–5 and C-6, Appendix C)

Gamma Spectrometry

Monthly composites from all locations were analyzed for gamma-emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C–I.3, Appendix C)

2. Ground Water

Quarterly or more frequent grab samples were collected at location D-35. No samples were available from location D-23 until June, 2019, because the location was vacant and the water was shut off. These locations could be affected by Dresden's effluent releases and by sources upstream on the Kankakee River. The following analyses were performed:

Tritium

All were analyzed for tritium activity (Table C–II.1, Appendix C). Tritium was not detected in any of the 4 samples from Location D-35. Tritium was detected in one of seven samples from Location D-23 at a concentration of 200 pCi/L. Concentrations detected were consistent with those detected in previous years.
(Figure C–7, Appendix C)

Gamma Spectrometry

All samples were analyzed for gamma-emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C-II.2, Appendix C)

3. Fish

Fish samples comprised of freshwater drum, smallmouth buffalo, golden redhorse, largemouth bass, channel catfish and common carp were collected at two locations (D-28 and D-46) semiannually. Location D-28 could be affected by Dresden's effluent releases. The following analysis was performed:

Gamma Spectrometry

The edible portion of fish samples from both locations was analyzed for gamma-emitting nuclides (Table C–III.1, Appendix C). Only naturally-occurring nuclides (not shown on the tables) were found at both locations. No fission or activation products were detected.

4. Sediment

Aquatic sediment samples were collected at one location (D-27) semiannually. This downstream location could be affected by Dresden's effluent releases. The following analysis was performed:

Gamma Spectrometry

Sediment samples from the location were analyzed for gamma-emitting nuclides (Table C–IV.1, Appendix C). No fission or activation products were detected.

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from fourteen locations on a weekly basis. The fourteen locations were separated into four groups: On-site samplers (D-01, D-02 and D-03), Near-field samplers within 3.1 miles of the site (D-04, D-07, D-45, D-53, D-56 and D-58), Far-field samplers between 5 and 10 km (3.1 and 6.2 miles) from the site (D-08, D-10, D-14 and D-55) and the Control sampler between 10 and 30 km (6.2 and 18.6 miles) from the site (D-12). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters. (Table C–V.1 and C–V.2, Appendix C)

Detectable gross beta activity was observed at all locations. Comparison of results among the four groups aid in determining the effects, if any, resulting from the operation of DNPS. The results from the On-Site locations ranged from 5.00E-3 to 3.60 E-2 pCi/m^3 with a mean of 1.60E-2 pCi/m^3. The results from the Near-Field locations ranged from 5.00E-3 to 3.90E-2 pCi/m^3 with a mean of 1.70E-2 pCi/m^3. The results from the Far-Field locations ranged from 5.00E-3 to 3.80E-2 pCi/m^3 with a mean of 1.70E–2 pCi/m^3. The results from the Control location ranged from 6.00E-3 to 3.50E-2 pCi/m^3 with a mean of 1.80E-2 pCi/m^3. Comparison of the 2019 air particulate data with previous year's data indicate no effects from the operation of DNPS. In addition a comparison of the weekly mean values for 2019 indicate no notable differences among the four groups.
(Figures C–8 through C-14, Appendix C)

Gamma Spectrometry

Samples were composited quarterly and analyzed for gamma-emitting nuclides (Table C–V.3, Appendix C). Only naturally-occurring nuclides (not shown on the tables) were found in these composite samples. No anthropogenic nuclides were detected and all required LLDs were met. These samples were consistent with historical quarterly results. All other nuclides were less than the MDC.

b. Airborne Iodine

Continuous air samples were collected from fourteen locations (D-01, D-02, D-03, D-04, D-07, D-08, D-10, D-12, D-14, D-45, D-53, D-55, D-56 and D-58) and analyzed weekly for I-131. All results were less than the MDC for I-131.
(Table C–VI.1, Appendix C)

2. Terrestrial

a. Milk

Milk (M) samples are typically collected biweekly at one control location (D-25) from May through October and monthly from November through April. Other than D-25, there are no additional milking animals within 10 kilometers (6.2 miles) of the site. The following analyses were performed:

Iodine-131

Milk samples from location D-25 were analyzed for concentrations of I-131. (Table C–VII.1, Appendix C)
No I-131 was detected and the LLD was met.

Gamma Spectrometry

Milk samples from location D-25 were analyzed for concentrations of gamma-emitting nuclides. Only naturally-occurring nuclides (not shown on the tables) were found in all samples. No other gamma-emitting nuclides were detected and all required LLDs were met. (Table C–VII.2, Appendix C)

b. Food Products

Food product samples were collected at six locations (D-Control, D-Quad 1, D-Quad 2, D-Quad 3 D-Quad 4, and SECTOR N) when available. Four locations, (D-Quad 1, D-Quad 2, D-Quad 3 and D-Quad 4) could be affected by Dresden's effluent releases. The following analysis was performed:

Gamma Spectrometry

Samples from six locations were analyzed for gamma-emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C–VIII.1, Appendix C)

C. Ambient Gamma Radiation

Forty-six OSLD locations were established around the site. Results of OSLD measurements are listed in Tables C–IX.1 to C–IX.3, Appendix C.

Most OSLD measurements were below 43 mrem/quarter, with a range of 17.9 to 42.1 mrem/quarter. A comparison of the Inner Ring, Outer Ring and Other locations' data to the Control Location data, indicate that the ambient gamma radiation levels from the Control location (D-12-01 and D-12-02) were comparable.

D. Land Use Survey

A Land Use Survey conducted on September 4, 2019 around the Dresden Nuclear Power Station (DNPS) was performed by EIML for Exelon Generation, LLC to comply with Section 12.6.2 of the Dresden Offsite Dose Calculation Manual (ODCM). The purpose of the survey was to document the nearest resident or industrial facility, milk producing animal, and livestock in each of the sixteen 22 ½ degree sectors within 10 km (6.2 miles) around the site. There were no changes required to the DNPS REMP as a result of this survey. The results are summarized below:

Distance in Miles from the DNPS Reactor Buildings				
Sector		Residence Miles	Livestock Miles	Milk Farm Miles
A	N	1.5	1.4	-
B	NNE	0.8	-	-
C	NE	0.8	5.8	-
D	ENE	0.7	1.7	-
E	E	1.1	-	-
F	ESE	1.0	-	-
G	SE	0.6	-	-
H	SSE	0.5	-	-
J	S	0.5	-	-
K	SSW	3.3	-	-
L	SW	3.6	-	11.4
M	WSW	5.9	-	-
N	W	3.5	0.5	-
P	WNW	3.2	0.5	-
Q	NW	2.2	0.5	-
R	NNW	0.8	1.0	-

E. Errata Data

There was no errata data in 2019.

F. Summary of Results – Inter-Laboratory Comparison Program

The TBE Laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation, and water matrices for various analytes. The PE samples supplied by Analytics Inc., Environmental Resource Associates (ERA) and Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

A. Analytics Evaluation Criteria

Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE evaluates the reported ratios based on internal QC requirements based on the DOE MAPEP criteria.

B. ERA Evaluation Criteria

ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, National Environmental Laboratory Accreditation Conference (NELAC), state-specific Performance Testing (PT) program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression

equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

C. DOE Evaluation Criteria

MAPEP's evaluation report provides an acceptance range with associated flag values. MAPEP defines three levels of performance:

- Acceptable (flag = "A") - result within ± 20% of the reference value
- Acceptable with Warning (flag = "W") - result falls in the ± 20% to ± 30% of the reference value
- Not Acceptable (flag = "N") – bias is greater than 30% of the reference value

Note: The Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) samples are created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained at commercial nuclear power facilities.

For the TBE laboratory, 119 out of 129 analyses performed met the specified acceptance criteria. Ten analyses did not meet the specified acceptance criteria for the following reasons and were addressed through the TBE Corrective Action Program. A summary is found below:

1. The ERA April 2019 water Cs-134 result was evaluated as *Not Acceptable*. The reported value was 15.2 pCi/L (error 2.82 pCi/L) and the known result was 12.1 pCi/L (acceptance range of 8.39 - 14.4 pCi/L). With the error, the reported result overlaps the acceptable range. This sample was run as the workgroup duplicate on a different detector with a result of 10.7 pCi/L (within acceptable range). (NCR 19-10)
2. The ERA April 2019 water Sr-89 result was evaluated as *Not Acceptable*. The reported value was 44.9 pCi/L and the known result was 33.3 pCi/L (acceptance range of 24.5 - 40.1 pCi/L). The sample was only counted for 15 minutes instead of 200 minutes. The sample was re-prepped in duplicate and counted for 200 minutes with results of 30.7 ± 5.37 pCi/L and 33.0 ± 8.71 pCi/L. This was the 1st "high" failure for Sr-89 in 5 years. (NCR 19-11)
3. The MAPEP February 2019 soil Sr-90 result was not submitted and therefore evaluated as *Not Acceptable*. The sample was run in duplicate, with results of -1.32 ± 4.09 Bq/kg (<6.87) and -1.030 ± 3.55 Bq/kg (<5.97). The known result was a false positive test (no significant activity). TBE did not submit a result because it appeared

that the results may not be accurate. TBE analyzed a substitute soil Sr-90 sample from another vendor, with a result within the acceptable range. (NCR 19-12)

4. The MAPEP February 2019 water Am-241 result was evaluated as *Not Acceptable*. The reported value was 0.764 ± 0.00725 Bq/L with a known result of 0.582 Bq/L (acceptable range 0.407 - 0.757 Bq/L). TBE's result falls within the upper acceptable range with the error. It appeared that a non-radiological interference was added and lead to an increased mass and higher result. (NCR 19-13)
5. The MAPEP February 2019 vegetation Sr-90 result was evaluated as *Not Acceptable*. The reported result was -0.1060 ± 0.0328 Bq/kg and the known result was a false positive test (no significant activity). TBE's result was correct in that there was no activity. MAPEP's evaluation was a "statistical failure" at 3 standard deviations. (NCR 19-14)
6. The ERA October 2019 water Gross Alpha result was evaluated as *Not Acceptable*. TBE's reported result was 40.5 ± 10.3 pCi/L and the known result was 27.6 pCi/L (ratio of TBE to known result at 135%). With the associated error, the result falls within the acceptable range (14.0 - 36.3 pCi/L). The sample was run as the workgroup duplicate on a different detector with a result of 30.8 ± 9.17 pCi/L (within the acceptable range). This was the first failure for drinking water Gr-A since 2012. (NCR 19-23)
7. The ERA October 2019 water Sr-90 result was evaluated as *Not Acceptable*. TBE's reported result was 32.5 ± 2.12 pCi/L and the known result was 26.5 pCi/L (ratio of TBE to known result at 123%). With the associated error, the result falls within the acceptable range (19.2 - 30.9 pCi/L). The sample was run as the workgroup duplicate on a different detector with a result of 20.0 ± 1.91 pCi/L (within the acceptable range). Both TBE results are within internal QC limits. A substitute "quick response" sample was analyzed with an acceptable result of 18.6 pCi/L (known range of 13.2 - 22.1 pCi/L). (NCR 19-24)
8. The MAPEP August 2019 soil Ni-63 result of 436 ± 22.8 Bq/kg was evaluated as Not Acceptable. The known result was 629 Bq/kg (acceptable range 440 - 818 Bq/sample). With the associated error, the TBE result falls within the lower acceptance range. All associated QC was acceptable. No reason for failure could be found. This is the first failure for soil Ni-63 since 2012. (NCR 19-25).
9. The MAPEP August 2019 water Am-241 result was not reported and therefore evaluated as *Not Acceptable*. Initial review of the results showed a large peak where Am-241 should be (same as the February, 2019 sample results). It is believed that Th-228 was intentionally added as an interference. The sample was re-prepped and analyzed using a smaller sample aliquot. The unusual large peak (Th-228) was

seen again and also this time a smaller peak (Am-241). The result was 436 ± 22.8 Bq/L (acceptable range 0.365 ± 0.679 Bq/L). Th-228 is not a typical nuclide requested by clients, so there is no analytical purpose to take samples through an additional separation step. TBE will pursue using another vendor for Am-241 water cross-checks that more closely reflects actual customer samples. (NCR 19-26)

10. The Analytics September 2019 soil Cr-51 sample was evaluated as *Not Acceptable*. TBE's reported result of 0.765 ± 0.135 pCi/g exceeded the upper acceptance range (140% of the known result of 0.547 pCi/g). The TBE result was within the acceptable range (0.63 - 0.90 pCi/g) with the associated error. The Cr-51 result is very close to TBE's normal detection limit. In order to get a reportable result, the sample must be counted for 15 hours (10x longer than client samples). There is no client or regulatory requirement for this nuclide and TBE will remove Cr-51 from the reported gamma nuclides going forward. (NCR 19-27)

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

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APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING

REPORT SUMMARY

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR DRESDEN NUCLEAR POWER STATION, 2019

NAME OF FACILITY:	DRESDEN			DOCKET NUMBER:		50-010, 50-237 & 50-249		
LOCATION OF FACILITY:	MORRIS IL			REPORTING PERIOD:		2019		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) *RANGE*	CONTROL LOCATION MEAN (M) (F) *RANGE*	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) *RANGE*	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER	**GR-B**	34	4	*6.6*	*7.2*	*8.5*	D-52 CONTROL	0
(PCI/LITER)				*(12/12)*	*(22/22)*	*(12/12)*	DESPLAINES RIVER - UPSTREAM	
				2.7 - 10.1	*3.1 - 12.6*	*4.8 - 12.6*	1.1 MILES ESE OF SITE	
	H-3	12	2000	*350*	*1244*	*1244*	D-57 CONTROL	0
				(2/4)	*(2/8)*	*(2/4)*	KANKAKEE RIVER AT WILL ROAD(CONTROL)	
				216 - 484	*638 - 1850*	*638 - 1850*	2.0 MILES SE OF SITE	
	GAMMA	34						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0
	I-131		15	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
GROUND WATER	**H-3**	11	2000	*200*	*NA*	*200*	D-23 INDICATOR	0
(PCI/LITER)				*(1/11)*		*(1/7)*	THORSEN WELL	
							0.7 MILES S OF SITE	
	GAMMA	11						
	MN-54		15	<LLD	*NA*	-		0
	CO-58		15	<LLD	*NA*	-		0
	FE-59		30	<LLD	*NA*	-		0
	CO-60		15	<LLD	*NA*	-		0
	ZN-65		30	<LLD	*NA*	-		0
	NB-95		15	<LLD	*NA*	-		0
	ZR-95		30	<LLD	*NA*	-		0
	I-131		15	<LLD	*NA*	-		0
	CS-134		15	<LLD	*NA*	-		0
	CS-137		18	<LLD	*NA*	-		0
	BA-140		60	<LLD	*NA*	-		0
	LA-140		15	<LLD	*NA*	-		0

(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR DRESDEN NUCLEAR POWER STATION, 2019

NAME OF FACILITY:	DRESDEN			DOCKET NUMBER:		50-010, 50-237 & 50-249		
LOCATION OF FACILITY:	MORRIS IL			REPORTING PERIOD:		2019		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) *RANGE*	CONTROL LOCATION MEAN (M) (F) *RANGE*	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH	**GAMMA**	8						
(PCI/KG WET)	*MN-54*		130	<LLD	*NA*	-		0
	CO-58		130	<LLD	*NA*	-		0
	FE-59		260	<LLD	*NA*	-		0
	CO-60		130	<LLD	*NA*	-		0
	ZN-65		260	<LLD	*NA*	-		0
	NB-95		*NA*	<LLD	*NA*	-		0
	ZR-95		*NA*	<LLD	*NA*	-		0
	CS-134		130	<LLD	*NA*	-		0
	CS-137		150	<LLD	*NA*	-		0
	BA-140		*NA*	<LLD	*NA*	-		0
	LA-140		*NA*	<LLD	*NA*	-		0
SEDIMENT	**GAMMA**	2						
(PCI/KG DRY)	*MN-54*		*NA*	<LLD	*NA*	-		0
	CO-58		*NA*	<LLD	*NA*	-		0
	FE-59		*NA*	<LLD	*NA*	-		0
	CO-60		*NA*	<LLD	*NA*	-		0
	ZN-65		*NA*	<LLD	*NA*	-		0
	NB-95		*NA*	<LLD	*NA*	-		0
	ZR-95		*NA*	<LLD	*NA*	-		0
	CS-134		150	<LLD	*NA*	-		0
	CS-137		180	191 (2/2) *164 - 218*	NA	191 (2/2) *164 - 218*	D-27 INDICATOR DRESDEN LOCK AND DAM - DOWNSTREAM 0.8 MILES NW OF SITE	0
	BA-140		*NA*	<LLD	*NA*	-		0
	LA-140		*NA*	<LLD	*NA*	-		0
AIR PARTICULATE	**GR-B**	728	10	17 (674/676) *5 - 39*	18 (52/52) *6 - 35*	19 (52/52) *8 - 38*	D-55 INDICATOR RIDGE ROAD 4.3 MILES N OF SITE	0
(E-3 PCI/CU.M)	**GAMMA**	56						
	MN-54		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	CS-134		50	<LLD	<LLD	-		0

(M) *The Mean Values are calculated using the positive values.* ***(F)*** *Fraction of detectable measurement are indicated in parentheses*

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR DRESDEN NUCLEAR POWER STATION, 2019

NAME OF FACILITY:	DRESDEN			DOCKET NUMBER:		50-010, 50-237 & 50-249		
LOCATION OF FACILITY:	MORRIS IL			REPORTING PERIOD:		2019		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) *RANGE*	CONTROL LOCATION MEAN (M) (F) *RANGE*	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	CS-137		60	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
AIR IODINE	GAMMA	728						
(E-3 PCI/CU.M)	*I-131*		70	<LLD	<LLD	-		0
MILK/GRASS	I-131 (LOW LVL)	16	1	NA	<LLD	-		0
(PCI/LITER)								
	GAMMA	19						
	MN-54		*NA*	NA	<LLD	-		0
	CO-58		*NA*	NA	<LLD	-		0
	FE-59		*NA*	NA	<LLD	-		0
	CO-60		*NA*	NA	<LLD	-		0
	ZN-65		*NA*	NA	<LLD	-		0
	NB-95		*NA*	NA	<LLD	-		0
	ZR-95		*NA*	NA	<LLD	-		0
	CS-134		15	NA	<LLD	-		0
	CS-137		18	NA	<LLD	-		0
	BA-140		60	NA	<LLD	-		0
	LA-140		15	NA	<LLD	-		0
VEGETATION	GAMMA	22						
(PCI/KG WET)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
DIRECT RADIATION	OSLD-QUARTERLY	183	*NA*	28	25	34	D-201 INDICATOR	0
(MILLI-ROENTGEN/QTR.)				(179/179)	(4/4)	(3/3)		
				17.9 - 42.1	*20.7 - 34.2*	*28.8 - 42.1*	4.8 MILES N	

(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses

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APPENDIX B

LOCATION DESIGNATION, DISTANCE & DIRECTION, AND SAMPLE COLLECTION & ANALYTICAL METHODS

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TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Dresden Nuclear Power Station, 2019

Location	Location Description	Distance & Direction From Site
A.	Surface Water	
D-21	Illinois River at EJ&E Bridge (indicator)	1.4 miles WNW
D-52	DesPlaines River at Will Road, Upstream (control)	1.1 miles ESE
D-57	Kankakee River at Will Road (control)	2.0 miles SE
B.	Ground/Well Water	
D-23	Thorsen Well, Dresden Road (indicator)	0.7 miles S
D-35	Dresden Lock and Dam (indicator)	0.8 miles NW
C.	Milk - bi-weekly / monthly	
D-25	Biros Farm (control)	11.4 miles SW
D.	Air Particulates / Air Iodine	
D-01	Onsite Station 1 (indicator)	0.8 miles NW
D-02	Onsite Station 2 (indicator)	0.3 miles NNE
D-03	Onsite Station 3 (indicator)	0.4 miles S
D-04	Collins Road, on Station property(indicator)	0.8 miles W
D-07	Clay Products, Dresden Road (indicator)	2.6 miles S
D-08	Jugtown Road, Prairie Parks (indicator)	3.8 miles SW
D-10	Goose Lake Road, Goose Lake Village (indicator)	3.5 miles SSW
D-12	Quarry Road, Lisbon (control)	10.5 miles NW
D-14	Center Street, Channahon (indicator)	3.7 miles NE
D-45	McKinley Woods Road, Channahon (indicator)	1.7 miles ENE
D-53	Will Road, Hollyhock (indicator)	2.1 miles SSE
D-55	Ridge Road, Minooka (indicator)	4.3 miles N
D-56	Will Road, Wildfeather (indicator)	1.7 miles SE
D-58	Will Road, Marina (indicator)	1.1 miles ESE
E.	Fish	
D-28	Dresden Pool of Illinois River, Downstream (indicator)	0.9 miles NNW
D-46	DesPlaines River, Upstream (control)	1.2 miles ESE
F.	Sediment	
D-27	Illinois River at Dresden Lock and Dam, Downstream (indicator)	0.8 miles NW
G.	Vegetation	
Quadrant 1	26726 & 26819 McKinley Woods Road	1.7 miles ENE
Quadrant 2	3985 N. Will Road	2.1 miles SSE
Quadrant 3	3250 Perch Court	2.5 miles SSW
Quadrant 4	4740 Cemetery Road	2.1 miles W
Control	2035 Old Mazon Road	11 miles SW
D-42	Dresden Garden	0.4 miles N

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Dresden Nuclear Power Station, 2019

Location	Location Description	Distance & Direction From Site
H.	Environmental Dosimetry - OSLD	
Inner Ring		
D-58		1.1 miles ESE
D-101		1.0 miles N
D-102		1.3 miles NNE
D-103		1.2 miles NE
D-104		1.7 miles ENE
D-105		1.5 miles E
D-106		1.1 miles ESE
D-107		1.4 miles SE
D-108		1.9 miles SSE
D-109		0.8 miles S
D-110		0.9 miles SSW
D-111		0.6 miles SW
D-112		0.7 miles WSW
D-113		0.9 miles W
D-114		0.9 miles WNW
D-115		0.8 miles NW
D-116		1.0 miles NNW
Outer Ring		
D-201		4.8 miles N
D-202		5.1 miles NNE
D-203		4.7 miles NE
D-204		5.0 miles ENE
D-205		4.0 miles E
D-206		3.5 miles ESE
D-207		4.2 miles SE
D-208		4.9 miles SSE
D-209		4.1 miles S
D-210		4.9 miles SSW
D-211		4.8 miles SW
D-212		6.0 miles WSW
D-213		4.5 miles W
D-214		5.0 miles WNW
D-215		4.8 miles NW
D-216		4.9 miles NNW
Other Locations		
D-01	Onsite 1	0.8 miles NW
D-02	Onsite 2	0.3 miles NNE
D-03	Onsite 3	0.4 miles S
D-04	Collins Road, on Station property	0.8 miles W
D-07	Clay Products, Dresden Road	2.6 miles S
D-08	Jugtown Road, Prairie Parks	3.8 miles SW
D-10	Goose Lake Road, Goose Lake Village	3.5 miles SSW
D-14	Center Street, Channahon	3.7 miles NE
D-45	McKinley Woods Road, Channahon	1.7 miles ENE
D-53	Will Road, Hollyhock	2.1 miles SSE
D-55	Ridge Road, Minooka	4.3 miles N
D-56	Will Road, Wildfeather	1.7 miles SE
D-58	Will Road, Marina	1.1 miles ESE
Control		
D-12	Lisbon	10.5 miles NW

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Dresden Nuclear Power Station, 2019

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly composite sample or monthly composite from weekly grab samples	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual TBE, TBE-2023 Compositing of samples EIML-COMP-01 procedure for compositing water and milk samples	2 gallon	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Surface Water	Gross Beta	Monthly composite sample or monthly composite from weekly grab samples	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual TBE, TBE-2023 Compositing of samples EIML-COMP-01 procedure for compositing water and milk samples	2 gallon	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices
Surface Water	Tritium	Quarterly composite of monthly composite samples	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual TBE, TBE-2023 Compositing of samples EIML-COMP-01 procedure for compositing water and milk samples	500 ml	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation
Ground Water	Gamma Spectroscopy	Quarterly grab samples	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	2 gallon	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Ground Water	Tritium	Quarterly grab samples	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	500 ml	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation
Fish	Gamma Spectroscopy	Samples collected twice annually via electroshocking or other techniques	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	1000 grams (wet)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Sediment	Gamma Spectroscopy	Semi-annual grab samples	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	500 grams (dry)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Dresden Nuclear Power Station, 2019

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Dredging Spoils	Gamma Spectroscopy	Annual grab samples if dredging occurred within 1 mile of Dresden Station during the year.	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	500 grams (dry)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Air Particulates	Gross Beta	One-week of continuous air sampling through glass fiber filter paper	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	1 filter (approximately 280 cubic meters weekly)	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2023 Compositing of samples Env. Inc., AP-03 Procedure for compositing air particulate filters for gamma spectroscopic analysis	13 filters	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Air Iodine	Gamma Spectroscopy	One- or two-week composite of continuous air sampling through charcoal filter	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	1 filter (approximately 280 cubic meters weekly)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Milk	I-131	Bi-weekly grab sample May through October; Monthly all other times	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	2 gallon	TBE, TBE-2012 Radioiodine in Various Matrices
Milk	Gamma Spectroscopy	Bi-weekly grab sample May through October; Monthly all other times	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	2 gallon	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Food Products	Gamma Spectroscopy	Annual grab samples.	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	1000 grams	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	EIML-SPM-1, Environmental Incorporated Midwest Laboratory Sampling Procedures Manual	2 dosimeters at each location	Landauer Incorporated

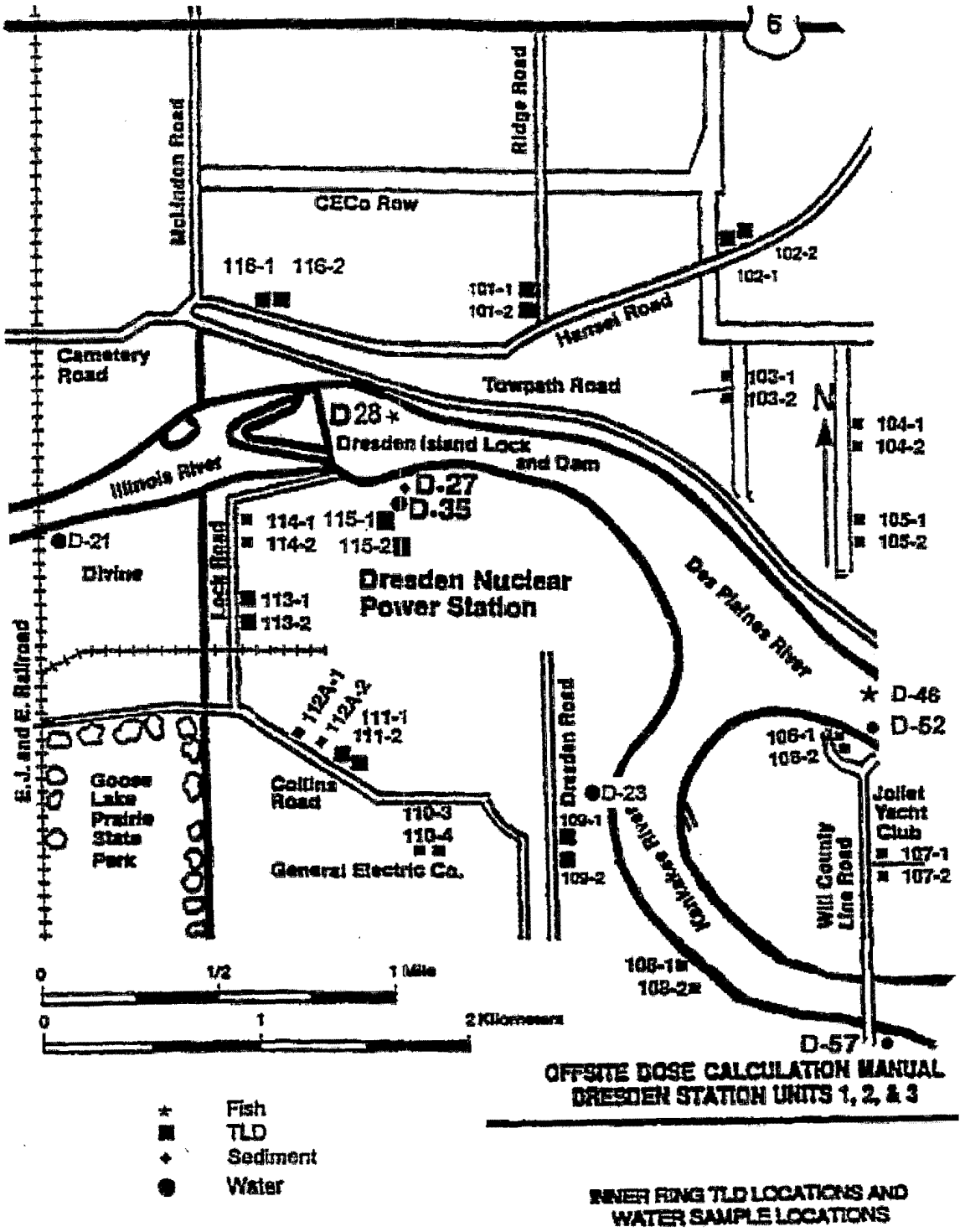

Figure B-1
Dresden Station Inner Ring OSLD Locations, Fish, Water, and Sediment Location, 2019

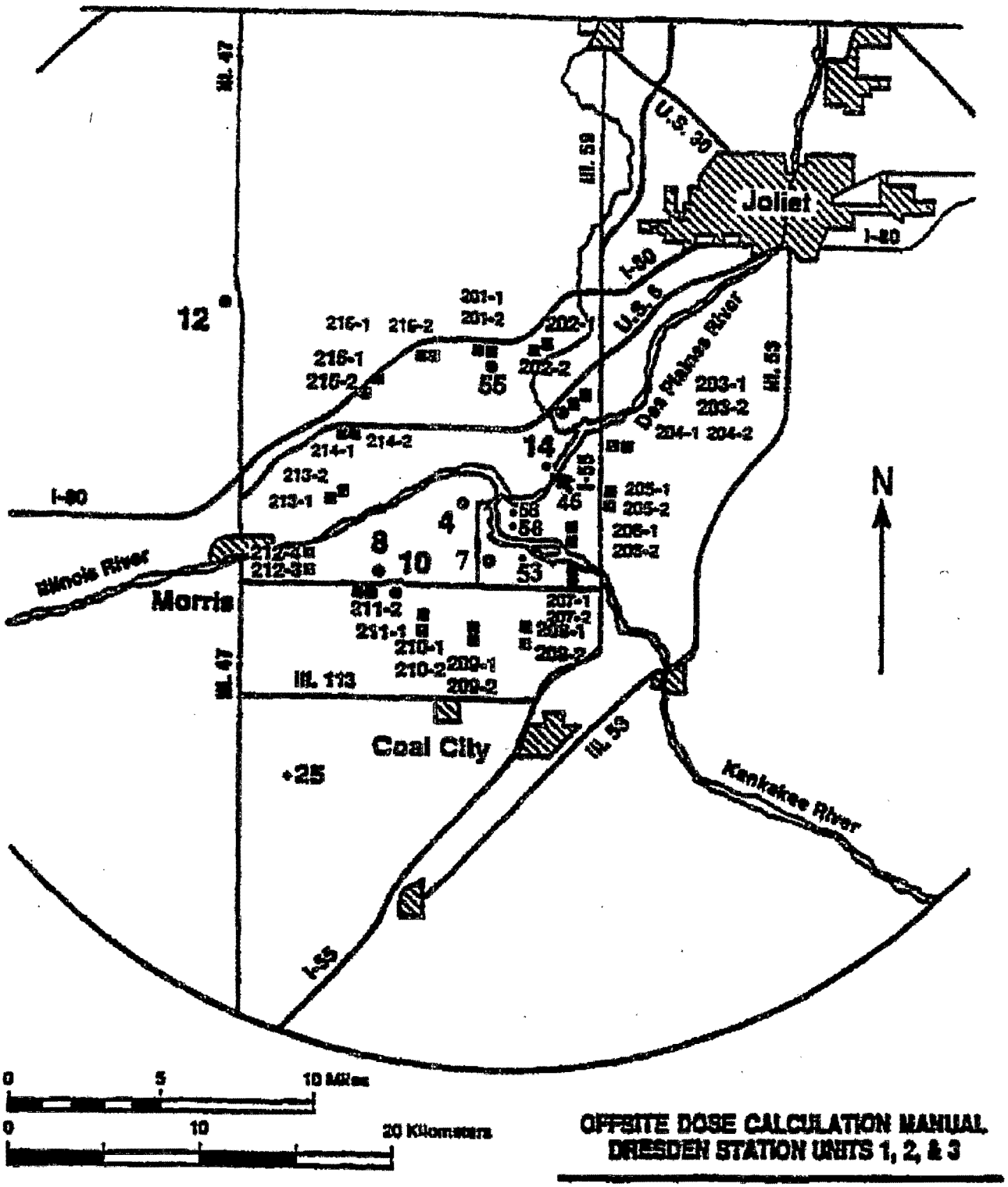

Figure B-2
Dresden Station Fixed Air Sampling and
OSLD Sites, Outer Ring OSLD Locations and Milk Location, 2019

APPENDIX C

DATA TABLES AND FIGURES

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Table C-I.1 **CONCENTRATIONS OF GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	D-21	D-52	D-57
12/28/18 - 01/25/19	8.3 ± 2.7	12.6 ± 3.0	*(1)*
01/25/19 - 02/22/19	7.2 ± 2.4	9.9 ± 2.7	*(1)*
02/22/19 - 03/29/19	5.7 ± 2.0	6.6 ± 2.2	3.1 ± 1.7
03/29/19 - 04/26/19	5.0 ± 2.1	9.6 ± 2.5	4.8 ± 2.1
04/26/19 - 05/31/19	2.8 ± 1.8	7.0 ± 2.5	5.6 ± 2.2
05/31/19 - 06/28/19	2.7 ± 1.6	4.8 ± 2.2	6.0 ± 2.1
06/28/19 - 07/26/19	5.6 ± 2.2	6.7 ± 2.4	4.3 ± 2.1
07/26/19 - 08/30/19	6.7 ± 2.1	6.3 ± 2.0	4.7 ± 1.8
08/30/19 - 09/28/19	6.7 ± 1.9	8.0 ± 2.2	6.5 ± 2.0
09/28/19 - 10/25/19	9.2 ± 2.4	11.5 ± 2.5	7.0 ± 2.2
10/25/19 - 11/30/19	9.7 ± 2.5	9.0 ± 2.5	6.9 ± 2.1
11/30/19 - 12/27/19	10.1 ± 2.6	10.5 ± 2.9	6.3 ± 2.3
MEAN ± 2 STD DEV	6.6 ± 0.7	8.5 ± 0.6	5.5 ± 0.4

Table C-I.2 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	D-21	D-52	D-57
01/25/19 - 03/29/19	< 182	< 183	< 188
03/29/19 - 06/28/19	< 196	< 194	< 195
06/28/19 - 09/28/19	484 ± 139	< 193	1850 ± 255
09/28/19 - 12/27/19	216 ± 123	< 189	638 ± 144
MEAN ± 2 STD DEV	350 ± 379	-	1244 ± 1714

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION
THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-I.3

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER + 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
D-21	12/28/18 - 01/25/19	< 7	< 6	< 12	< 6	< 10	< 7	< 12	< 10	< 6	< 6	< 27	< 6
	01/25/19 - 02/22/19	< 4	< 5	< 10	< 6	< 11	< 5	< 8	< 7	< 5	< 6	< 20	< 7
	02/22/19 - 03/29/19	< 7	< 9	< 10	< 7	< 13	< 7	< 13	< 11	< 7	< 6	< 27	< 9
	03/29/19 - 04/26/19	< 8	< 8	< 17	< 9	< 18	< 9	< 16	< 14	< 11	< 10	< 36	< 14
	04/26/19 - 05/31/19	< 7	< 6	< 18	< 9	< 14	< 6	< 10	< 12	< 6	< 5	< 30	< 12
	05/31/19 - 06/28/19	< 6	< 7	< 12	< 6	< 16	< 6	< 11	< 12	< 6	< 7	< 30	< 11
	06/28/19 - 07/26/19	< 7	< 7	< 15	< 8	< 14	< 9	< 10	< 12	< 8	< 6	< 30	< 8
	07/26/19 - 08/30/19	< 7	< 6	< 18	< 7	< 12	< 7	< 12	< 12	< 7	< 7	< 33	< 9
	08/30/19 - 09/28/19	< 4	< 5	< 12	< 5	< 13	< 6	< 12	< 8	< 9	< 7	< 23	< 11
	09/28/19 - 10/25/19	< 7	< 7	< 15	< 7	< 17	< 7	< 11	< 10	< 8	< 8	< 31	< 8
	10/25/19 - 11/30/19	< 8	< 8	< 17	< 8	< 17	< 8	< 12	< 11	< 9	< 8	< 32	< 11
	11/30/19 - 12/27/19	< 6	< 6	< 11	< 6	< 10	< 7	< 10	< 8	< 6	< 6	< 31	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
D-52	01/04/19 - 01/18/19	< 5	< 5	< 10	< 6	< 8	< 5	< 8	< 12	< 5	< 5	< 26	< 11
	02/08/19 - 02/22/19	< 7	< 7	< 15	< 12	< 17	< 7	< 12	< 9	< 8	< 7	< 27	< 13
	03/01/19 - 03/29/19	< 7	< 8	< 15	< 10	< 13	< 5	< 9	< 12	< 7	< 7	< 25	< 11
	04/05/19 - 04/26/19	< 9	< 9	< 18	< 9	< 15	< 7	< 14	< 12	< 7	< 7	< 34	< 11
	05/03/19 - 05/31/19	< 5	< 6	< 15	< 6	< 15	< 6	< 12	< 10	< 8	< 7	< 25	< 10
	06/07/19 - 06/28/19	< 6	< 5	< 8	< 5	< 9	< 6	< 9	< 12	< 6	< 6	< 33	< 5
	07/05/19 - 07/26/19	< 6	< 5	< 15	< 8	< 17	< 6	< 11	< 8	< 9	< 7	< 25	< 10
	08/02/19 - 08/30/19	< 4	< 5	< 11	< 5	< 11	< 5	< 8	< 8	< 6	< 4	< 23	< 8
	09/06/19 - 09/28/19	< 6	< 6	< 12	< 8	< 12	< 7	< 12	< 8	< 7	< 7	< 28	< 7
	10/04/19 - 10/25/19	< 7	< 8	< 15	< 8	< 16	< 8	< 15	< 12	< 11	< 7	< 31	< 10
	11/01/19 - 11/30/19	< 8	< 8	< 17	< 9	< 14	< 7	< 13	< 11	< 7	< 9	< 30	< 11
	12/07/19 - 12/27/19	< 8	< 7	< 13	< 8	< 12	< 7	< 13	< 9	< 7	< 8	< 27	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
D-57	12/28/18 - 01/25/19 *(1)*												
	01/25/19 - 02/22/19 *(1)*												
	03/29/19 - 03/29/19	< 6	< 6	< 10	< 7	< 14	< 5	< 12	< 10	< 7	< 6	< 30	< 6
	04/26/19 - 04/26/19	< 6	< 6	< 12	< 7	< 12	< 5	< 11	< 8	< 5	< 5	< 23	< 7
	05/31/19 - 05/31/19	< 5	< 7	< 14	< 6	< 11	< 6	< 12	< 10	< 8	< 7	< 30	< 11
	06/28/19 - 06/28/19	< 4	< 6	< 11	< 6	< 12	< 6	< 9	< 11	< 5	< 5	< 29	< 14
	07/26/19 - 07/26/19	< 7	< 9	< 18	< 6	< 15	< 7	< 14	< 13	< 6	< 8	< 34	< 7
	08/30/19 - 08/30/19	< 6	< 6	< 12	< 7	< 11	< 7	< 10	< 11	< 6	< 6	< 28	< 12
	09/28/19 - 09/28/19	< 7	< 6	< 14	< 7	< 16	< 8	< 13	< 10	< 7	< 7	< 32	< 9
	10/25/19 - 10/25/19	< 5	< 6	< 12	< 7	< 14	< 8	< 13	< 11	< 9	< 7	< 31	< 11
	11/30/19 - 11/30/19	< 6	< 9	< 16	< 11	< 12	< 7	< 14	< 11	< 8	< 8	< 26	< 9
	12/27/19 - 12/27/19	< 6	< 6	< 9	< 7	< 14	< 6	< 9	< 10	< 6	< 5	< 25	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.1 **CONCENTRATIONS OF TRITIUM IN GROUND WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	D-23	D-35
01/11/19 - 01/11/19	*(1)*	< 189
04/12/19 - 04/12/19	*(1)*	< 185
06/28/19 - 06/28/19	< 178	
07/12/19 - 07/12/19	< 190	< 196
08/16/19 - 08/16/19	< 197	
09/13/19 - 09/13/19	< 189	
10/11/19 - 10/11/19	< 176	< 173
11/08/19 - 11/08/19	200 ± 123	
12/13/19 - 12/13/19	< 196	
MEAN ± 2 STD DEV	200 ± 0	

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Tables C-II.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUND WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD		Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
D-23	01/11/19 - 01/11/19	*(1)*												
	04/12/19 - 04/12/19	*(1)*												
	06/28/19 - 06/28/19		< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 3	< 2	< 2	< 10	< 3
	07/12/19 - 07/12/19		< 6	< 5	< 14	< 4	< 12	< 5	< 10	< 7	< 5	< 5	< 27	< 11
	08/16/19 - 08/16/19		< 7	< 8	< 14	< 7	< 16	< 7	< 12	< 11	< 8	< 8	< 35	< 10
	09/13/19 - 09/13/19		< 9	< 8	< 14	< 7	< 13	< 9	< 14	< 13	< 10	< 8	< 34	< 13
	10/11/19 - 10/11/19		< 4	< 5	< 9	< 4	< 9	< 5	< 6	< 6	< 5	< 5	< 19	< 7
	11/08/19 - 11/08/19		< 5	< 6	< 15	< 7	< 11	< 7	< 8	< 8	< 5	< 6	< 25	< 8
	12/13/19 - 12/13/19		< 6	< 5	< 16	< 8	< 15	< 8	< 9	< 9	< 6	< 7	< 30	< 12
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-
D-35	01/11/19 - 01/11/19		< 8	< 7	< 14	< 6	< 14	< 8	< 12	< 11	< 8	< 7	< 32	< 10
	04/12/19 - 04/12/19		< 4	< 3	< 8	< 5	< 9	< 4	< 8	< 7	< 5	< 5	< 19	< 7
	07/12/19 - 07/12/19		< 7	< 5	< 12	< 8	< 8	< 7	< 11	< 9	< 7	< 6	< 23	< 9
	10/11/19 - 10/11/19		< 3	< 4	< 9	< 4	< 9	< 5	< 7	< 7	< 5	< 5	< 17	< 7
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-III.1

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/KG WET + 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
D-28	*PREDATOR*											
Largemouth Bass	10/16/19	< 34	< 43	< 110	< 47	< 108	< 53	< 57	< 40	< 43	< 179	< 50
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-28	*BOTTOM FEEDER*											
Freshwater Drum	05/23/19	< 50	< 54	< 103	< 60	< 128	< 68	< 109	< 69	< 59	< 359	< 132
Smallmouth Buffalo	05/23/19	< 59	< 71	< 141	< 41	< 123	< 56	< 104	< 63	< 70	< 415	< 118
Golden Redhorse	10/16/19	< 60	< 60	< 101	< 44	< 114	< 57	< 89	< 75	< 59	< 280	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-46	*PREDATOR*											
Largemouth Bass	10/16/19	< 45	< 32	< 103	< 42	< 88	< 43	< 101	< 45	< 55	< 166	< 37
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-46	*BOTTOM FEEDER*											
Channel Catfish	05/23/19	< 46	< 55	< 103	< 63	< 82	< 50	< 115	< 52	< 41	< 293	< 108
Common Carp	05/23/19	< 68	< 66	< 125	< 67	< 166	< 89	< 126	< 76	< 74	< 418	< 121
Common Carp	10/16/19	< 53	< 46	< 125	< 41	< 111	< 54	< 71	< 53	< 47	< 212	< 73
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1

CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
D-27	05/29/19	< 83	< 82	< 222	< 107	< 177	< 99	< 164	< 123	164 ± 65	< 634	< 113
	10/15/19	< 87	< 105	< 225	< 117	< 212	< 105	< 203	< 103	218 ± 85	< 445	< 153
MEAN ± 2 STD DEV		-	-	-	-	-	-	-	-	191 ± 77	-	-

Table C-V.1

CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

COLLECTION	GROUP I			GROUP II					
PERIOD	D-01	D-02	D-03	D-04	D-07	D-45	D-53	D-56	D-58
01/04/19 - 01/11/19	19 ± 4	27 ± 5	28 ± 5	30 ± 5	22 ± 5	26 ± 5	22 ± 5	23 ± 5	23 ± 5
01/11/19 - 01/18/19	12 ± 4	17 ± 4	21 ± 4	20 ± 4	14 ± 4	13 ± 4	16 ± 4	18 ± 4	17 ± 4
01/18/19 - 01/25/19	10 ± 4	14 ± 4	13 ± 4	15 ± 4	18 ± 4	14 ± 4	15 ± 4	15 ± 4	13 ± 4
01/25/19 - 02/02/19	20 ± 4	26 ± 4	23 ± 4	29 ± 4	23 ± 4	20 ± 4	23 ± 4	35 ± 6	19 ± 4
02/02/19 - 02/08/19	12 ± 4	15 ± 4	13 ± 4	21 ± 5	16 ± 4	14 ± 4	15 ± 4	14 ± 4	12 ± 4
02/08/19 - 02/15/19	8 ± 4	11 ± 4	13 ± 4	15 ± 4	13 ± 4	12 ± 4	13 ± 4	9 ± 4	11 ± 4
02/15/19 - 02/22/19	16 ± 4	16 ± 4	22 ± 4	23 ± 5	18 ± 4	14 ± 4	16 ± 4	15 ± 4	16 ± 4
02/22/19 - 03/01/19	21 ± 4	25 ± 5	27 ± 5	24 ± 4	24 ± 4	21 ± 4	26 ± 5	23 ± 4	22 ± 4
03/01/19 - 03/08/19	17 ± 4	18 ± 4	22 ± 5	23 ± 5	20 ± 4	15 ± 4	22 ± 5	19 ± 4	18 ± 4
03/08/19 - 03/15/19	20 ± 4	21 ± 4	23 ± 5	25 ± 5	20 ± 4	22 ± 5	24 ± 5	18 ± 4	18 ± 4
03/15/19 - 03/22/19	11 ± 4	17 ± 4	18 ± 4	21 ± 4	11 ± 4	15 ± 4	14 ± 4	13 ± 4	16 ± 4
03/22/19 - 03/29/19	15 ± 4	13 ± 4	16 ± 4	16 ± 4	12 ± 4	12 ± 4	17 ± 4	11 ± 4	13 ± 4
03/29/19 - 04/05/19	11 ± 4	15 ± 4	14 ± 4	17 ± 4	15 ± 4	14 ± 4	15 ± 4	16 ± 4	12 ± 4
04/05/19 - 04/12/19	5 ± 3	11 ± 4	7 ± 4	9 ± 4	8 ± 4	7 ± 4	7 ± 4	6 ± 3	6 ± 4
04/12/19 - 04/19/19	9 ± 3	12 ± 3	13 ± 3	14 ± 4	8 ± 3	11 ± 3	11 ± 3	12 ± 3	10 ± 3
04/19/19 - 04/26/19	13 ± 4	12 ± 4	12 ± 4	14 ± 4	14 ± 4	11 ± 4	17 ± 4	10 ± 4	13 ± 4
04/26/19 - 05/03/19	6 ± 3	7 ± 3	13 ± 5	8 ± 4	7 ± 3	7 ± 3	11 ± 4	5 ± 3	8 ± 3
05/01/19 - 05/10/19	11 ± 4	10 ± 4	12 ± 3	9 ± 3	12 ± 4	13 ± 4	12 ± 4	8 ± 4	9 ± 4
05/10/19 - 05/17/19	13 ± 4	17 ± 4	19 ± 4	18 ± 4	17 ± 4	15 ± 4	18 ± 4	17 ± 4	11 ± 4
05/17/19 - 05/24/19	7 ± 3	5 ± 3	9 ± 4	< 5	7 ± 3	10 ± 4	9 ± 4	5 ± 3	6 ± 3
05/24/19 - 05/31/19	11 ± 4	10 ± 4	10 ± 4	12 ± 4	10 ± 4	8 ± 3	11 ± 4	11 ± 4	9 ± 3
05/31/19 - 06/07/19	11 ± 4	18 ± 4	15 ± 4	16 ± 4	15 ± 4	13 ± 4	15 ± 4	17 ± 4	14 ± 4
06/07/19 - 06/14/19	14 ± 4	12 ± 4	16 ± 4	15 ± 4	15 ± 4	15 ± 4	17 ± 4	14 ± 4	12 ± 4
06/14/19 - 06/21/19	9 ± 3	12 ± 4	13 ± 4	14 ± 4	11 ± 3	15 ± 4	12 ± 4	14 ± 4	8 ± 3
06/21/19 - 06/28/19	13 ± 4	19 ± 4	19 ± 4	18 ± 4	18 ± 4	16 ± 4	16 ± 4	14 ± 4	14 ± 4
06/28/19 - 07/05/19	18 ± 4	19 ± 4	16 ± 4	23 ± 5	17 ± 4	23 ± 4	21 ± 4	20 ± 4	16 ± 4
07/05/19 - 07/12/19	15 ± 4	13 ± 4	15 ± 4	18 ± 4	14 ± 4	16 ± 4	19 ± 4	14 ± 4	12 ± 4
07/12/19 - 07/19/19	15 ± 4	16 ± 4	13 ± 4	15 ± 4	10 ± 3	10 ± 3	14 ± 4	7 ± 3	10 ± 4
07/19/19 - 07/26/19	10 ± 4	11 ± 4	13 ± 4	13 ± 4	11 ± 4	13 ± 4	10 ± 3	10 ± 3	12 ± 4
07/26/19 - 08/02/19	13 ± 4	14 ± 4	17 ± 4	19 ± 4	17 ± 4	14 ± 4	17 ± 4	11 ± 4	18 ± 4
08/02/19 - 08/09/19	16 ± 4	19 ± 4	16 ± 4	18 ± 4	18 ± 4	20 ± 4	19 ± 4	23 ± 6	18 ± 4
08/09/19 - 08/16/19	17 ± 4	17 ± 4	16 ± 4	18 ± 4	15 ± 4	22 ± 4	17 ± 4	16 ± 4	15 ± 4
08/16/19 - 08/23/19	13 ± 4	10 ± 3	13 ± 4	15 ± 4	12 ± 4	10 ± 3	15 ± 4	11 ± 3	13 ± 4
08/23/19 - 08/30/19	14 ± 4	10 ± 4	15 ± 4	13 ± 4	10 ± 4	16 ± 4	15 ± 4	13 ± 4	12 ± 4
08/30/19 - 09/06/19	17 ± 4	18 ± 4	15 ± 4	20 ± 4	15 ± 4	19 ± 4	17 ± 4	15 ± 4	12 ± 4
09/06/19 - 09/13/19	26 ± 5	34 ± 5	30 ± 5	31 ± 5	30 ± 5	32 ± 5	32 ± 5	25 ± 5	26 ± 5
09/13/19 - 09/20/19	19 ± 4	21 ± 4	21 ± 4	20 ± 4	20 ± 4	23 ± 4	20 ± 4	18 ± 4	17 ± 4
09/20/19 - 09/27/19	19 ± 4	22 ± 4	22 ± 4	19 ± 4	18 ± 4	26 ± 5	18 ± 4	18 ± 4	15 ± 4
09/27/19 - 10/04/19	12 ± 4	8 ± 4	10 ± 4	11 ± 4	10 ± 4	10 ± 4	16 ± 4	11 ± 4	9 ± 4
10/04/19 - 10/11/19	17 ± 4	21 ± 5	19 ± 4	18 ± 4	15 ± 4	22 ± 5	22 ± 5	13 ± 4	15 ± 4
10/11/19 - 10/18/19	8 ± 4	9 ± 4	11 ± 4	18 ± 5	11 ± 4	12 ± 4	14 ± 4	9 ± 4	7 ± 4
10/18/19 - 10/25/19	15 ± 4	17 ± 4	19 ± 5	19 ± 5	18 ± 5	20 ± 5	18 ± 4	13 ± 4	17 ± 4
10/25/19 - 11/01/19	15 ± 4	12 ± 4	17 ± 4	15 ± 4	15 ± 4	15 ± 4	15 ± 4	12 ± 4	11 ± 4
11/01/19 - 11/08/19	14 ± 4	17 ± 4	19 ± 4	15 ± 4	14 ± 4	15 ± 4	16 ± 4	16 ± 4	16 ± 4
11/08/19 - 11/15/19	19 ± 4	20 ± 4	24 ± 5	20 ± 4	20 ± 4	21 ± 4	21 ± 4	22 ± 5	22 ± 4
11/15/19 - 11/22/19	16 ± 4	23 ± 5	25 ± 5	27 ± 5	17 ± 4	22 ± 5	24 ± 5	17 ± 4	18 ± 4
11/22/19 - 11/30/19	13 ± 3	20 ± 4	14 ± 3	17 ± 4	14 ± 4	20 ± 4	17 ± 4	15 ± 4	16 ± 4
11/30/19 - 12/07/19	13 ± 4	11 ± 4	11 ± 4	8 ± 3	12 ± 4	15 ± 4	12 ± 4	13 ± 4	13 ± 4
12/07/19 - 12/13/19	25 ± 5	28 ± 5	25 ± 5	29 ± 6	30 ± 6	35 ± 6	27 ± 5	21 ± 5	24 ± 5
12/13/19 - 12/20/19	29 ± 5	32 ± 5	31 ± 5	32 ± 5	32 ± 5	39 ± 6	26 ± 5	27 ± 5	27 ± 5
12/20/19 - 12/27/19	26 ± 5	36 ± 5	30 ± 5	32 ± 5	29 ± 5	33 ± 5	35 ± 5	26 ± 5	25 ± 5
12/27/19 - 01/04/20	20 ± 4	26 ± 4	24 ± 4	24 ± 4	24 ± 4	26 ± 4	19 ± 4	19 ± 4	19 ± 4
MEAN ± 2 STD DEV	15 ± 10	17 ± 14	17 ± 12	19 ± 12	16 ± 12	17 ± 14	17 ± 11	15 ± 12	15 ± 10

THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-V.1

CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

COLLECTION	GROUP III				GROUP IV
PERIOD	D-08	D-10	D-14	D-55	D-12
01/04/19 - 01/11/19	23 ± 5	25 ± 5	28 ± 5	24 ± 5	26 ± 5
01/11/19 - 01/18/19	18 ± 4	14 ± 4	18 ± 4	16 ± 4	16 ± 4
01/18/19 - 01/25/19	13 ± 4	12 ± 4	18 ± 4	15 ± 4	12 ± 4
01/25/19 - 02/02/19	25 ± 4	20 ± 4	28 ± 4	17 ± 3	23 ± 4
02/02/19 - 02/08/19	15 ± 4	16 ± 4	15 ± 4	14 ± 4	12 ± 4
02/08/19 - 02/15/19	15 ± 4	11 ± 4	12 ± 4	10 ± 4	12 ± 4
02/15/19 - 02/22/19	18 ± 4	17 ± 4	19 ± 4	18 ± 4	17 ± 4
02/22/19 - 03/01/19	22 ± 4	19 ± 4	27 ± 5	22 ± 4	22 ± 4
03/01/19 - 03/08/19	19 ± 4	20 ± 5	18 ± 4	18 ± 4	18 ± 4
03/08/19 - 03/15/19	18 ± 4	18 ± 4	19 ± 4	17 ± 4	19 ± 4
03/15/19 - 03/22/19	15 ± 4	11 ± 4	22 ± 4	16 ± 4	16 ± 4
03/22/19 - 03/29/19	13 ± 4	11 ± 3	14 ± 4	11 ± 3	14 ± 4
03/29/19 - 04/05/19	13 ± 4	15 ± 4	18 ± 4	14 ± 4	13 ± 4
04/05/19 - 04/12/19	8 ± 4	< 5	7 ± 4	9 ± 4	6 ± 4
04/12/19 - 04/19/19	13 ± 3	13 ± 4	11 ± 3	12 ± 3	10 ± 3
04/19/19 - 04/26/19	15 ± 4	13 ± 4	13 ± 4	19 ± 4	13 ± 4
04/26/19 - 05/03/19	8 ± 3	9 ± 3	8 ± 3	12 ± 4	7 ± 3
05/01/19 - 05/10/19	9 ± 4	12 ± 4	11 ± 4	16 ± 4	17 ± 4
05/10/19 - 05/17/19	12 ± 4	17 ± 4	20 ± 4	16 ± 4	18 ± 4
05/17/19 - 05/24/19	10 ± 4	5 ± 3	8 ± 3	9 ± 4	6 ± 3
05/24/19 - 05/31/19	10 ± 4	9 ± 3	11 ± 4	14 ± 4	12 ± 4
05/31/19 - 06/07/19	13 ± 4	12 ± 4	20 ± 4	18 ± 4	18 ± 4
06/07/19 - 06/14/19	13 ± 4	12 ± 4	13 ± 4	20 ± 5	21 ± 5
06/14/19 - 06/21/19	12 ± 4	12 ± 3	19 ± 4	20 ± 4	14 ± 4
06/21/19 - 06/28/19	15 ± 4	15 ± 4	17 ± 4	20 ± 5	17 ± 4
06/28/19 - 07/05/19	14 ± 4	19 ± 4	22 ± 4	23 ± 5	23 ± 5
07/05/19 - 07/12/19	12 ± 4	15 ± 4	16 ± 4	17 ± 4	19 ± 4
07/12/19 - 07/19/19	12 ± 4	16 ± 4	14 ± 4	13 ± 4	15 ± 4
07/19/19 - 07/26/19	10 ± 4	10 ± 4	12 ± 4	8 ± 3	13 ± 4
07/26/19 - 08/02/19	16 ± 4	17 ± 4	19 ± 4	21 ± 5	17 ± 4
08/02/19 - 08/09/19	16 ± 4	15 ± 4	19 ± 4	20 ± 4	21 ± 4
08/09/19 - 08/16/19	17 ± 4	18 ± 4	23 ± 4	20 ± 4	20 ± 4
08/16/19 - 08/23/19	14 ± 4	10 ± 3	14 ± 4	12 ± 4	16 ± 4
08/23/19 - 08/30/19	15 ± 4	14 ± 4	16 ± 4	15 ± 4	17 ± 4
08/30/19 - 09/06/19	16 ± 4	18 ± 4	18 ± 4	20 ± 4	18 ± 4
09/06/19 - 09/13/19	33 ± 5	30 ± 5	32 ± 5	35 ± 5	29 ± 5
09/13/19 - 09/20/19	16 ± 4	22 ± 4	24 ± 4	21 ± 4	26 ± 5
09/20/19 - 09/27/19	20 ± 4	19 ± 4	22 ± 5	32 ± 5	24 ± 5
09/27/19 - 10/04/19	7 ± 3	12 ± 4	13 ± 4	15 ± 4	12 ± 4
10/04/19 - 10/11/19	17 ± 4	20 ± 5	19 ± 4	18 ± 4	23 ± 5
10/11/19 - 10/18/19	8 ± 4	12 ± 4	11 ± 4	14 ± 4	16 ± 4
10/18/19 - 10/25/19	19 ± 5	19 ± 5	20 ± 5	20 ± 5	19 ± 5
10/25/19 - 11/01/19	14 ± 4	16 ± 4	17 ± 4	19 ± 4	20 ± 4
11/01/19 - 11/08/19	12 ± 4	13 ± 4	20 ± 4	19 ± 4	17 ± 4
11/08/19 - 11/15/19	22 ± 4	21 ± 4	25 ± 5	25 ± 5	23 ± 5
11/15/19 - 11/22/19	21 ± 5	20 ± 5	27 ± 5	28 ± 5	25 ± 5
11/22/19 - 11/30/19	15 ± 4	15 ± 4	15 ± 4	19 ± 4	17 ± 4
11/30/19 - 12/07/19	9 ± 3	15 ± 4	14 ± 4	17 ± 4	15 ± 4
12/07/19 - 12/13/19	28 ± 5	29 ± 5	25 ± 5	29 ± 5	32 ± 6
12/13/19 - 12/20/19	32 ± 5	29 ± 5	24 ± 5	38 ± 6	35 ± 5
12/20/19 - 12/27/19	32 ± 5	33 ± 5	35 ± 5	38 ± 5	35 ± 5
12/27/19 - 01/04/20	23 ± 4	18 ± 4	21 ± 4	25 ± 4	25 ± 4
MEAN ± 2 STD DEV	16 ± 12	16 ± 11	18 ± 12	19 ± 13	18 ± 13

THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-V.2

MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

GROUP I - ON-SITE LOCATIONS				GROUP II - NEAR-FIELD LOCATIONS				GROUP III - FAR-FIELD LOCATIONS				GROUP IV - CONTROL LOCATION			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
01/04/19 - 02/02/19	10	28	19 ± 12	01/04/19 - 02/02/19	13	35	20 ± 11	01/04/19 - 02/02/19	12	28	20 ± 11	01/04/19 - 02/02/19	12	26	19 ± 12
02/02/19 - 03/01/19	8	27	16 ± 12	02/02/19 - 03/01/19	9	26	17 ± 10	02/02/19 - 03/01/19	10	27	17 ± 9	02/02/19 - 03/01/19	12	22	16 ± 10
03/01/19 - 03/29/19	11	23	18 ± 7	03/01/19 - 03/29/19	11	25	17 ± 9	03/01/19 - 03/29/19	11	22	16 ± 7	03/01/19 - 03/29/19	14	19	17 ± 5
03/29/19 - 05/03/19	5	15	11 ± 6	03/29/19 - 05/03/19	5	17	11 ± 7	03/29/19 - 05/03/19	7	19	12 ± 7	03/29/19 - 05/03/19	6	13	10 ± 6
05/01/19 - 05/31/19	5	19	11 ± 8	05/01/19 - 05/31/19	5	18	11 ± 7	05/03/19 - 05/31/19	5	20	12 ± 8	05/03/19 - 05/31/19	6	18	13 ± 11
05/31/19 - 06/28/19	9	19	14 ± 7	05/31/19 - 06/28/19	8	18	14 ± 4	05/31/19 - 06/28/19	12	20	16 ± 7	05/31/19 - 06/28/19	14	21	17 ± 5
06/28/19 - 08/02/19	10	19	15 ± 5	06/28/19 - 08/02/19	7	23	15 ± 8	06/28/19 - 08/02/19	8	23	15 ± 8	06/28/19 - 08/02/19	13	23	17 ± 8
08/02/19 - 08/30/19	10	19	15 ± 6	08/02/19 - 08/30/19	10	23	16 ± 7	08/02/19 - 08/30/19	10	23	16 ± 6	08/02/19 - 08/30/19	16	21	18 ± 5
08/30/19 - 10/04/19	8	34	20 ± 14	08/30/19 - 10/04/19	9	32	19 ± 13	08/30/19 - 10/04/19	7	35	21 ± 15	08/30/19 - 10/04/19	12	29	22 ± 14
10/04/19 - 11/01/19	8	21	15 ± 8	10/04/19 - 11/01/19	7	22	15 ± 8	10/04/19 - 11/01/19	8	20	16 ± 7	10/04/19 - 11/01/19	16	23	19 ± 6
11/01/19 - 11/30/19	13	25	19 ± 8	11/01/19 - 11/30/19	14	27	18 ± 7	11/01/19 - 11/30/19	12	28	20 ± 10	11/01/19 - 11/30/19	17	25	21 ± 8
11/30/19 - 01/04/20	11	36	24 ± 15	11/30/19 - 01/04/20	8	39	24 ± 16	11/30/19 - 01/04/20	9	38	26 ± 16	11/30/19 - 01/04/20	15	35	28 ± 17
01/04/19 - 01/04/20	5	36	16 ± 12	01/04/19 - 01/04/20	5	39	17 ± 12	01/04/19 - 01/04/20	5	38	17 ± 12	01/04/19 - 01/04/20	6	35	18 ± 13

Table C-V.3

CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
D-01	01/04/19 - 03/29/19	< 3	< 3	< 5	< 3	< 6	< 3	< 6	< 3	< 3	< 17	< 6
	03/29/19 - 06/28/19	< 3	< 3	< 6	< 2	< 6	< 3	< 6	< 2	< 3	< 37	< 8
	06/28/19 - 10/04/19	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 11	< 3
	10/04/19 - 01/04/20	< 3	< 3	< 4	< 4	< 7	< 3	< 4	< 2	< 2	< 14	< 6
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-02	01/04/19 - 03/29/19	< 2	< 3	< 6	< 3	< 4	< 3	< 4	< 2	< 2	< 11	< 7
	03/29/19 - 06/28/19	< 3	< 3	< 8	< 3	< 6	< 3	< 5	< 3	< 3	< 28	< 13
	06/28/19 - 10/04/19	< 2	< 3	< 5	< 3	< 5	< 2	< 5	< 2	< 3	< 13	< 4
	10/04/19 - 01/04/20	< 4	< 3	< 6	< 4	< 8	< 3	< 5	< 4	< 4	< 20	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-03	01/04/19 - 03/29/19	< 3	< 3	< 7	< 4	< 6	< 4	< 5	< 3	< 3	< 20	< 6
	03/29/19 - 06/28/19	< 2	< 3	< 7	< 3	< 6	< 3	< 4	< 3	< 2	< 28	< 11
	06/28/19 - 10/04/19	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 7	< 5
	10/04/19 - 01/04/20	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 1	< 2	< 9	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-04	01/04/19 - 03/29/19	< 4	< 3	< 7	< 3	< 6	< 4	< 6	< 3	< 4	< 21	< 8
	03/29/19 - 06/28/19	< 2	< 3	< 7	< 3	< 5	< 3	< 5	< 2	< 2	< 26	< 17
	06/28/19 - 10/04/19	< 2	< 2	< 5	< 3	< 6	< 2	< 4	< 2	< 3	< 12	< 6
	10/04/19 - 01/04/20	< 2	< 2	< 4	< 1	< 5	< 1	< 3	< 2	< 2	< 9	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-07	01/04/19 - 03/29/19	< 1	< 2	< 6	< 3	< 5	< 2	< 4	< 2	< 2	< 12	< 4
	03/29/19 - 06/28/19	< 1	< 3	< 6	< 3	< 5	< 3	< 4	< 3	< 2	< 22	< 12
	06/28/19 - 10/04/19	< 2	< 2	< 6	< 2	< 4	< 3	< 4	< 2	< 3	< 13	< 5
	10/04/19 - 01/04/20	< 2	< 2	< 5	< 2	< 5	< 2	< 3	< 2	< 2	< 9	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-08	01/04/19 - 03/29/19	< 2	< 2	< 5	< 2	< 6	< 2	< 4	< 2	< 2	< 12	< 7
	03/29/19 - 06/28/19	< 3	< 2	< 5	< 3	< 7	< 4	< 6	< 2	< 3	< 32	< 8
	06/28/19 - 10/04/19	< 1	< 2	< 3	< 2	< 4	< 2	< 3	< 2	< 2	< 9.8	< 2
	10/04/19 - 01/04/20	< 2	< 2	< 4	< 1	< 4	< 2	< 3	< 2	< 2	< 10	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-10	01/04/19 - 03/29/19	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 2	< 2	< 12	< 3
	03/29/19 - 06/28/19	< 2	< 2	< 6	< 3	< 7	< 3	< 5	< 2	< 2	< 31	< 11
	06/28/19 - 10/04/19	< 2	< 2	< 4	< 2	< 8	< 3	< 4	< 2	< 2	< 10	< 5
	10/04/19 - 01/04/20	< 2	< 2	< 6	< 3	< 7	< 2	< 4	< 2	< 2	< 12	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-V.3

CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
D-12	01/04/19 - 03/29/19	< 3	< 3	< 7	< 4	< 6	< 3	< 6	< 3	< 2	< 13	< 5
	03/29/19 - 06/28/19	< 2	< 2	< 3	< 2	< 3	< 2	< 5	< 2	< 2	< 25	< 12
	06/28/19 - 10/04/19	< 2	< 2	< 4	< 2	< 6	< 2	< 4	< 2	< 2	< 13	< 4
	10/04/19 - 01/04/20	< 4	< 3	< 8	< 4	< 7	< 3	< 6	< 4	< 3	< 18	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-14	01/04/19 - 03/29/19	< 2	< 2	< 6	< 3	< 6	< 2	< 5	< 3	< 2	< 16	< 4
	03/29/19 - 06/28/19	< 3	< 4	< 8	< 3	< 8	< 3	< 7	< 2	< 3	< 39	< 14
	06/28/19 - 10/04/19	< 2	< 2	< 4	< 1	< 3	< 2	< 2	< 1	< 2	< 9	< 5
	10/04/19 - 01/04/20	< 2	< 3	< 5	< 3	< 6	< 2	< 4	< 3	< 2	< 11	< 3
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-45	01/04/19 - 03/29/19	< 3	< 3	< 6	< 3	< 5	< 4	< 4	< 3	< 2	< 19	< 5
	03/29/19 - 06/28/19	< 2	< 3	< 5	< 3	< 5	< 3	< 6	< 2	< 2	< 25	< 8
	06/28/19 - 10/04/19	< 2	< 2	< 6	< 3	< 5	< 2	< 4	< 3	< 2	< 13	< 5
	10/04/19 - 01/04/20	< 3	< 3	< 7	< 4	< 8	< 4	< 6	< 4	< 3	< 20	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-53	01/04/19 - 03/29/19	< 3	< 3	< 6	< 3	< 8	< 3	< 5	< 3	< 3	< 20	< 8
	03/29/19 - 06/28/19	< 2	< 2	< 8	< 2	< 5	< 3	< 5	< 2	< 2	< 33	< 13
	06/28/19 - 10/04/19	< 2	< 2	< 5	< 2	< 5	< 3	< 4	< 2	< 2	< 12	< 5
	10/04/19 - 01/04/20	< 2	< 2	< 4	< 2	< 5	< 2	< 3	< 2	< 1	< 11	< 3
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-55	01/04/19 - 03/29/19	< 3	< 2	< 6	< 3	< 5	< 2	< 4	< 2	< 2	< 16	< 6
	03/29/19 - 06/28/19	< 2	< 3	< 7	< 2	< 5	< 2	< 4	< 3	< 2	< 29	< 10
	06/28/19 - 10/04/19	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 2	< 2	< 10	< 4
	10/04/19 - 01/04/20	< 2	< 2	< 2	< 2	< 4	< 1	< 3	< 3	< 2	< 9	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-56	01/04/19 - 03/29/19	< 2	< 2	< 4	< 3	< 5	< 2	< 5	< 2	< 3	< 14	< 6
	03/29/19 - 06/28/19	< 2	< 3	< 5	< 3	< 5	< 2	< 4	< 2	< 1	< 23	< 8
	06/28/19 - 10/04/19	< 2	< 2	< 4	< 3	< 6	< 2	< 3	< 3	< 2	< 17	< 6
	10/04/19 - 01/04/20	< 2	< 2	< 3	< 3	< 4	< 2	< 3	< 2	< 2	< 7	< 3
	MEAN	-	-	-	-	-	-	-	-	-	-	-
D-58	01/04/19 - 03/29/19	< 3	< 3	< 7	< 3	< 7	< 3	< 6	< 4	< 3	< 20	< 7
	03/29/19 - 06/28/19	< 2	< 3	< 5	< 2	< 4	< 3	< 3	< 2	< 2	< 28	< 8
	06/28/19 - 10/04/19	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 2	< 2	< 9	< 4
	10/04/19 - 01/04/20	< 2	< 2	< 5	< 2	< 4	< 2	< 5	< 2	< 1	< 10	< 3
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VI.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES**
COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019
RESULTS IN UNITS OF E-3 PCI/CU METER + 2 SIGMA

COLLECTION	GROUP I			GROUP II					
PERIOD	D-01	D-02	D-03	D-04	D-07	D-45	D-53	D-56	D-58
01/04/19 - 01/11/19	< 26	< 26	< 26	< 26	< 21	< 41	< 38	< 32	< 39
01/11/19 - 01/18/19	< 26	< 47	< 47	< 47	< 47	< 50	< 49	< 48	< 49
01/18/19 - 01/25/19	< 41	< 43	< 43	< 43	< 17	< 48	< 47	< 45	< 24
01/25/19 - 02/02/19	< 23	< 23	< 23	< 23	< 12	< 17	< 19	< 34	< 21
02/02/19 - 02/08/19	< 50	< 53	< 53	< 53	< 19	< 43	< 42	< 22	< 40
02/08/19 - 02/15/19	< 57	< 56	< 56	< 56	< 47	< 25	< 29	< 29	< 29
02/15/19 - 02/22/19	< 35	< 35	< 35	< 35	< 14	< 39	< 16	< 38	< 38
02/22/19 - 03/01/19	< 43	< 42	< 42	< 42	< 30	< 24	< 22	< 19	< 23
03/01/19 - 03/08/19	< 23	< 23	< 23	< 23	< 18	< 33	< 38	< 38	< 38
03/08/19 - 03/15/19	< 40	< 39	< 39	< 39	< 38	< 26	< 59	< 58	< 59
03/15/19 - 03/22/19	< 16	< 46	< 46	< 46	< 46	< 48	< 54	< 54	< 55
03/22/19 - 03/29/19	< 18	< 44	< 44	< 45	< 45	< 37	< 36	< 35	< 37
03/29/19 - 04/05/19	< 38	< 39	< 39	< 38	< 36	< 27	< 25	< 25	< 25
04/05/19 - 04/12/19	< 12	< 29	< 29	< 29	< 30	< 28	< 13	< 7	< 13
04/12/19 - 04/19/19	< 41	< 41	< 41	< 40	< 23	< 22	< 49	< 49	< 49
04/19/19 - 04/26/19	< 13	< 37	< 37	< 37	< 37	< 33	< 36	< 36	< 36
04/26/19 - 05/03/19	< 24	< 25	< 42	< 42	< 20	< 33	< 26	< 32	< 31
05/01/19 - 05/10/19	< 25	< 26	< 20	< 8	< 26	< 25	< 20	< 19	< 20
05/10/19 - 05/17/19	< 35	< 36	< 36	< 36	< 19	< 36	< 35	< 35	< 35
05/17/19 - 05/24/19	< 49	< 49	< 49	< 49	< 21	< 28	< 36	< 36	< 36
05/24/19 - 05/31/19	< 35	< 36	< 36	< 36	< 16	< 28	< 27	< 22	< 27
05/31/19 - 06/07/19	< 9	< 21	< 21	< 21	< 21	< 15	< 55	< 54	< 55
06/07/19 - 06/14/19	< 28	< 67	< 67	< 67	< 67	< 40	< 32	< 31	< 32
06/14/19 - 06/21/19	< 25	< 25	< 25	< 25	< 43	< 20	< 36	< 36	< 36
06/21/19 - 06/28/19	< 18	< 43	< 43	< 44	< 44	< 22	< 41	< 41	< 40
06/28/19 - 07/05/19	< 54	< 55	< 54	< 54	< 16	< 37	< 36	< 30	< 37
07/05/19 - 07/12/19	< 22	< 23	< 23	< 23	< 19	< 45	< 44	< 18	< 44
07/12/19 - 07/19/19	< 49	< 47	< 47	< 20	< 47	< 42	< 45	< 47	< 46
07/19/19 - 07/26/19	< 31	< 30	< 30	< 30	< 51	< 27	< 26	< 10	< 25
07/26/19 - 08/02/19	< 44	< 19	< 45	< 44	< 45	< 26	< 46	< 46	< 46
08/02/19 - 08/09/19	< 24	< 28	< 28	< 28	< 28	< 45	< 45	< 26	< 45
08/09/19 - 08/16/19	< 45	< 46	< 46	< 46	< 26	< 19	< 19	< 15	< 18
08/16/19 - 08/23/19	< 33	< 33	< 33	< 32	< 25	< 35	< 34	< 14	< 34
08/23/19 - 08/30/19	< 31	< 32	< 31	< 26	< 32	< 43	< 36	< 36	< 36
08/30/19 - 09/06/19	< 18	< 43	< 43	< 43	< 43	< 39	< 45	< 44	< 44
09/06/19 - 09/13/19	< 26	< 29	< 29	< 29	< 29	< 48	< 29	< 29	< 29
09/13/19 - 09/20/19	< 19	< 23	< 22	< 22	< 23	< 32	< 22	< 22	< 22
09/20/19 - 09/27/19	< 16	< 36	< 36	< 36	< 36	< 20	< 39	< 39	< 39
09/28/19 - 10/04/19	< 34	< 34	< 34	< 34	< 29	< 21	< 52	< 50	< 52
10/04/19 - 10/11/19	< 26	< 27	< 22	< 27	< 27	< 48	< 14	< 14	< 14
10/11/19 - 10/18/19	< 23	< 20	< 24	< 24	< 24	< 34	< 37	< 37	< 37
10/18/19 - 10/25/19	< 54	< 23	< 54	< 54	< 54	< 30	< 47	< 20	< 47
10/25/19 - 11/01/19	< 43	< 43	< 43	< 43	< 23	< 29	< 28	< 29	< 13
11/01/19 - 11/08/19	< 48	< 47	< 47	< 20	< 48	< 37	< 32	< 32	< 32
11/08/19 - 11/15/19	< 20	< 41	< 41	< 41	< 41	< 20	< 11	< 11	< 11
11/15/19 - 11/22/19	< 14	< 29	< 29	< 29	< 29	< 20	< 19	< 20	< 19
11/22/19 - 11/30/19	< 29	< 29	< 29	< 29	< 26	< 25	< 24	< 25	< 20
11/30/19 - 12/07/19	< 34	< 29	< 34	< 34	< 34	< 34	< 20	< 21	< 20
12/07/19 - 12/13/19	< 22	< 25	< 25	< 25	< 25	< 48	< 28	< 29	< 28
12/13/19 - 12/20/19	< 25	< 25	< 25	< 25	< 25	< 38	< 30	< 30	< 30
12/20/19 - 12/27/19	< 19	< 41	< 41	< 42	< 42	< 59	< 27	< 23	< 27
12/27/19 - 01/04/20	< 23	< 23	< 23	< 23	< 11	< 22	< 29	< 30	< 29
MEAN	-	-	-	-	-	-	-	-	-

Table C-VI.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES**
COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019
RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

COLLECTION PERIOD	GROUP III				GROUP IV
	D-08	D-10	D-14	D-55	D-12
01/04/19 - 01/11/19	< 25	< 26	< 26	< 40	< 25
01/11/19 - 01/18/19	< 17	< 49	< 48	< 49	< 50
01/18/19 - 01/25/19	< 37	< 38	< 40	< 46	< 39
01/25/19 - 02/02/19	< 30	< 29	< 29	< 19	< 29
02/02/19 - 02/08/19	< 44	< 45	< 46	< 41	< 44
02/08/19 - 02/15/19	< 48	< 48	< 17	< 30	< 48
02/15/19 - 02/22/19	< 35	< 34	< 35	< 39	< 36
02/22/19 - 03/01/19	< 36	< 36	< 36	< 23	< 36
03/01/19 - 03/08/19	< 42	< 44	< 42	< 37	< 42
03/08/19 - 03/15/19	< 46	< 48	< 46	< 59	< 47
03/15/19 - 03/22/19	< 19	< 47	< 47	< 29	< 49
03/22/19 - 03/29/19	< 29	< 35	< 36	< 35	< 37
03/29/19 - 04/05/19	< 36	< 37	< 20	< 21	< 36
04/05/19 - 04/12/19	< 23	< 27	< 27	< 13	< 28
04/12/19 - 04/19/19	< 27	< 28	< 27	< 50	< 28
04/19/19 - 04/26/19	< 18	< 31	< 32	< 36	< 34
04/26/19 - 05/03/19	< 47	< 48	< 48	< 32	< 46
05/01/19 - 05/10/19	< 9	< 25	< 25	< 20	< 25
05/10/19 - 05/17/19	< 23	< 23	< 23	< 30	< 23
05/17/19 - 05/24/19	< 27	< 27	< 23	< 37	< 27
05/24/19 - 05/31/19	< 38	< 38	< 39	< 27	< 38
05/31/19 - 06/07/19	< 15	< 12	< 15	< 57	< 15
06/07/19 - 06/14/19	< 17	< 40	< 40	< 32	< 40
06/14/19 - 06/21/19	< 43	< 18	< 43	< 37	< 43
06/21/19 - 06/28/19	< 9	< 22	< 22	< 41	< 22
06/28/19 - 07/05/19	< 38	< 38	< 38	< 39	< 38
07/05/19 - 07/12/19	< 45	< 45	< 45	< 45	< 45
07/12/19 - 07/19/19	< 19	< 19	< 18	< 18	< 19
07/19/19 - 07/26/19	< 52	< 52	< 23	< 27	< 53
07/26/19 - 08/02/19	< 31	< 30	< 31	< 47	< 31
08/02/19 - 08/09/19	< 36	< 36	< 36	< 46	< 36
08/09/19 - 08/16/19	< 31	< 31	< 31	< 19	< 31
08/16/19 - 08/23/19	< 25	< 25	< 22	< 35	< 25
08/23/19 - 08/30/19	< 43	< 43	< 43	< 37	< 18
08/30/19 - 09/06/19	< 38	< 38	< 16	< 46	< 38
09/06/19 - 09/13/19	< 48	< 20	< 48	< 29	< 49
09/13/19 - 09/20/19	< 31	< 31	< 32	< 23	< 13
09/20/19 - 09/27/19	< 23	< 20	< 24	< 47	< 23
09/28/19 - 10/04/19	< 22	< 24	< 9	< 47	< 22
10/04/19 - 10/11/19	< 48	< 48	< 20	< 14	< 48
10/11/19 - 10/18/19	< 14	< 33	< 34	< 37	< 34
10/18/19 - 10/25/19	< 30	< 25	< 30	< 48	< 30
10/25/19 - 11/01/19	< 23	< 23	< 24	< 29	< 23
11/01/19 - 11/08/19	< 37	< 21	< 37	< 32	< 37
11/08/19 - 11/15/19	< 24	< 24	< 24	< 11	< 24
11/15/19 - 11/22/19	< 19	< 15	< 20	< 19	< 20
11/22/19 - 11/30/19	< 31	< 31	< 31	< 25	< 31
11/30/19 - 12/07/19	< 33	< 33	< 14	< 21	< 33
12/07/19 - 12/13/19	< 48	< 20	< 48	< 28	< 48
12/13/19 - 12/20/19	< 37	< 37	< 18	< 31	< 38
12/20/19 - 12/27/19	< 57	< 57	< 25	< 27	< 58
12/27/19 - 01/04/20	< 22	< 10	< 22	< 30	< 22
MEAN	-	-	-	-	-

Table C-VII.1 CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER + 2 SIGMA

COLLECTION PERIOD	CONTROL FARM D-25
01/03/19	< 0.5
02/06/19	< 0.9
03/06/19	< 0.8
04/04/19	< 0.7
05/01/19	< 0.8
05/16/19	< 0.4
05/30/19	< 0.8
06/13/19	< 0.9
06/26/19	< 0.9
07/10/19	< 0.8
07/24/19	< 0.5
08/08/19	< 0.8
08/22/19	< 0.5
09/04/19	< 0.9
09/19/19	*(1)*
12/05/19	< 0.6
MEAN	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VII.2

CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
D-25	01/03/19	< 7	< 8	< 16	< 8	< 17	< 8	< 9	< 7	< 7	< 35	< 8
	02/06/19	< 7	< 7	< 14	< 8	< 18	< 8	< 14	< 9	< 8	< 37	< 9
	03/06/19	< 5	< 6	< 13	< 6	< 11	< 5	< 10	< 6	< 6	< 20	< 7
	04/04/19	< 8	< 9	< 21	< 9	< 14	< 9	< 14	< 9	< 8	< 37	< 11
	05/01/19	< 6	< 6	< 14	< 5	< 14	< 7	< 11	< 6	< 6	< 32	< 8
	05/16/19	< 8	< 9	< 18	< 11	< 17	< 8	< 14	< 9	< 8	< 40	< 10
	05/30/19	< 8	< 8	< 15	< 10	< 17	< 9	< 12	< 7	< 8	< 37	< 12
	06/13/19	< 5	< 5	< 13	< 7	< 13	< 6	< 10	< 6	< 6	< 24	< 6
	06/26/19	< 7	< 8	< 13	< 7	< 17	< 8	< 11	< 8	< 8	< 35	< 13
	07/10/19	< 8	< 9	< 16	< 9	< 19	< 8	< 14	< 7	< 8	< 43	< 7
	07/24/19	< 8	< 7	< 19	< 7	< 20	< 7	< 14	< 8	< 7	< 30	< 9
	08/08/19	< 10	< 8	< 19	< 9	< 16	< 8	< 14	< 10	< 9	< 37	< 9
	08/22/19	< 8	< 8	< 13	< 9	< 19	< 7	< 14	< 10	< 9	< 33	< 13
	09/04/19	< 8	< 9	< 21	< 10	< 18	< 8	< 13	< 9	< 9	< 36	< 11
	09/19/19 *(1)*											
	12/05/19	< 9	< 10	< 24	< 12	< 20	< 9	< 17	< 9	< 9	< 39	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VIII.1

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
D-CONTROL													
Carrots	08/30/19	< 25	< 25	< 55	< 28	< 57	< 25	< 46	< 43	< 27	< 26	< 120	< 33
Brussels Sprouts	08/30/19	< 26	< 28	< 57	< 36	< 61	< 26	< 43	< 41	< 30	< 30	< 122	< 30
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
D-QUAD 2													
Cabbage	08/09/19	< 18	< 25	< 43	< 16	< 42	< 21	< 31	< 26	< 16	< 20	< 96	< 25
Carrots	08/09/19	< 33	< 38	< 82	< 28	< 90	< 26	< 52	< 47	< 36	< 36	< 143	< 30
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
D-QUAD 3													
Broccoli Leaves	08/09/19	< 17	< 17	< 41	< 20	< 40	< 18	< 29	< 27	< 20	< 20	< 82	< 24
Collard Greens	08/09/19	< 17	< 18	< 32	< 18	< 35	< 18	< 29	< 27	< 18	< 18	< 80	< 21
Red Beets/Carrots	09/12/19	< 25	< 25	< 52	< 25	< 52	< 25	< 45	< 39	< 29	< 27	< 112	< 34
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
D-QUAD 4													
Cabbage	08/02/19	< 36	< 41	< 86	< 44	< 67	< 32	< 56	< 47	< 40	< 41	< 139	< 13
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
D-42													
Cabbage	07/26/19	< 31	< 33	< 76	< 23	< 85	< 39	< 55	< 46	< 38	< 40	< 152	< 30
Kale	07/26/19	< 17	< 15	< 34	< 18	< 36	< 17	< 29	< 23	< 19	< 18	< 69	< 21
Red Beets	07/26/19	< 12	< 12	< 25	< 13	< 28	< 12	< 20	< 18	< 13	< 13	< 51	< 14
Cabbage	08/09/19	< 29	< 33	< 67	< 25	< 94	< 35	< 69	< 54	< 42	< 38	< 161	< 41
Purple Kale	08/09/19	< 37	< 45	< 101	< 44	< 105	< 42	< 77	< 56	< 46	< 45	< 147	< 49
Red Beets	08/09/19	< 37	< 36	< 74	< 28	< 84	< 36	< 54	< 43	< 33	< 35	< 168	< 37
Cabbage	08/23/19	< 36	< 28	< 76	< 30	< 66	< 29	< 60	< 42	< 34	< 37	< 109	< 28
Kale	08/23/19	< 35	< 40	< 88	< 42	< 84	< 37	< 63	< 55	< 39	< 45	< 134	< 59
Red Beets	08/23/19	< 40	< 40	< 85	< 41	< 86	< 42	< 63	< 58	< 43	< 34	< 147	< 49
Red Beets	09/06/19	< 38	< 48	< 91	< 39	< 99	< 32	< 63	< 51	< 39	< 38	< 166	< 59
Kale	09/20/19	< 40	< 29	< 62	< 42	< 86	< 29	< 62	< 46	< 40	< 35	< 122	< 41
Red Beets	09/20/19	< 31	< 37	< 41	< 39	< 99	< 40	< 81	< 57	< 52	< 40	< 170	< 51
Kale	10/04/19	< 33	< 36	< 68	< 40	< 74	< 34	< 61	< 51	< 39	< 35	< 150	< 37
Swiss Chard	10/04/19	< 19	< 25	< 55	< 24	< 49	< 22	< 35	< 29	< 23	< 21	< 102	< 27
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IX.1 QUARTERLY OSLD RESULTS FOR DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
D-01	29.3 ± 12.9	25.1	24.3	29.5	38.4
D-02	28.8 ± 8.9	25.9	27.1	26.8	35.4
D-03	26.1 ± 14.6	22.3	21.1	24.1	36.9
D-04	30.2 ± 10.7	26.9	26.3	29.7	37.9
D-07	27.4 ± 12.1	23.9	24.6	24.7	36.5
D-08	29.4 ± 12.0	25.4	25.6	28.4	38.1
D-10	29.1 ± 12.7	25.5	24.6	27.8	38.4
D-12	25.4 ± 12.3	21.7	20.7	24.9	34.2
D-14	26.4 ± 13.1	23.9	22.0	23.4	36.1
D-45	29.1 ± 11.6	24.5	25.7	28.9	37.4
D-53	26.2 ± 11.2	22.5	22.9	24.8	34.4
D-55	28.8 ± 13.5	26.3	22.2	28.5	38.1
D-56	26.9 ± 11.4	24.7	21.7	26.3	35.0
D-58	25.5 ± 11.1	22.6	20.5	25.6	33.2
D-101	28.9 ± 14.5	23.9	23.5	29.1	39.1
D-102	30.5 ± 11.5	26.2	26.6	30.5	38.6
D-103	28.0 ± 12.4	24.1	24.5	26.0	37.2
D-104	30.6 ± 12.8	25.0	26.8	31.0	39.4
D-105	28.8 ± 11.8	25.5	25.0	27.0	37.5
D-106	26.1 ± 11.5	22.1	22.2	25.8	34.3
D-107	23.8 ± 12.4	21.9	17.9	22.7	32.5
D-108	27.7 ± 13.5	24.2	22.6	26.3	37.5
D-109	28.9 ± 12.4	25.7	23.4	29.0	37.5
D-110	31.8 ± 10.8	27.4	27.3	34.0	38.3
D-111	29.5 ± 10.2	26.6	25.5	28.9	36.8
D-112A	25.8 ± 14.4	20.6	21.5	24.9	36.2
D-113	26.5 ± 11.8	21.8	22.0	28.0	34.2
D-114	26.2 ± 12.3	22.6	22.1	24.9	35.3
D-115	29.2 ± 10.6	25.0	25.8	29.2	36.6
D-116	30.0 ± 11.2	26.1	24.9	31.8	37.1
D-201	34.4 ± 13.8	28.8	*(1)*	32.4	42.1
D-202	29.0 ± 11.1	24.9	25.9	28.2	37.1
D-203	28.5 ± 11.3	25.4	23.4	28.8	36.3
D-204	24.5 ± 10.4	19.4	23.1	23.6	31.7
D-205	27.0 ± 12.4	23.8	23.9	23.9	36.3
D-206	27.9 ± 13.5	24.1	23.0	26.8	37.7
D-207	27.4 ± 10.6	23.4	22.7	29.5	33.9
D-208	23.6 ± 12.5	19.8	20.7	21.0	33.0
D-209	24.2 ± 10.0	21.4	20.3	23.8	31.4
D-210	27.9 ± 13.7	22.4	23.9	27.8	37.6
D-211	28.7 ± 11.6	25.3	24.5	27.9	37.1
D-212	25.6 ± 10.7	21.5	21.5	26.6	32.8
D-213	25.6 ± 8.8	21.6	22.9	26.5	31.4
D-214	31.4 ± 12.4	26.8	27.5	31.1	40.3
D-215	31.1 ± 10.6	28.0	27.2	30.5	38.8
D-216	28.7 ± 11.6	23.9	25.1	29.1	36.8

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-IX.2 MEAN QUARTERLY OSLD RESULTS FOR THE INNER RING, OUTER RING, OTHER AND CONTROL LOCATIONS FOR DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS OF THE STATION DATA

COLLECTION PERIOD	INNER RING ± 2 S.D.	OUTER RING	OTHER	CONTROL
JAN-MAR	24.2 ± 4.0	23.8 ± 5.4	24.7 ± 2.8	21.7 ± 0
APR-JUN	23.7 ± 5.0	23.7 ± 4.2	24.0 ± 4.0	20.7 ± 0
JUL-SEP	27.9 ± 5.8	27.3 ± 6.1	26.9 ± 4.4	24.9 ± 0
OCT-DEC	36.5 ± 4.0	35.9 ± 6.5	36.9 ± 2.8	34.2 ± 0

TABLE C-IX.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF MREM/QUARTER

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
INNER RING	68	17.9	39..4	28.1 ± 11.4
OUTER RING	63	19.4	42.1	27.7 ± 11.4
OTHER	48	21.1	38.4	28.1 ± 11.0
CONTROL	4	20.7	34.2	25.4 ± 12.3

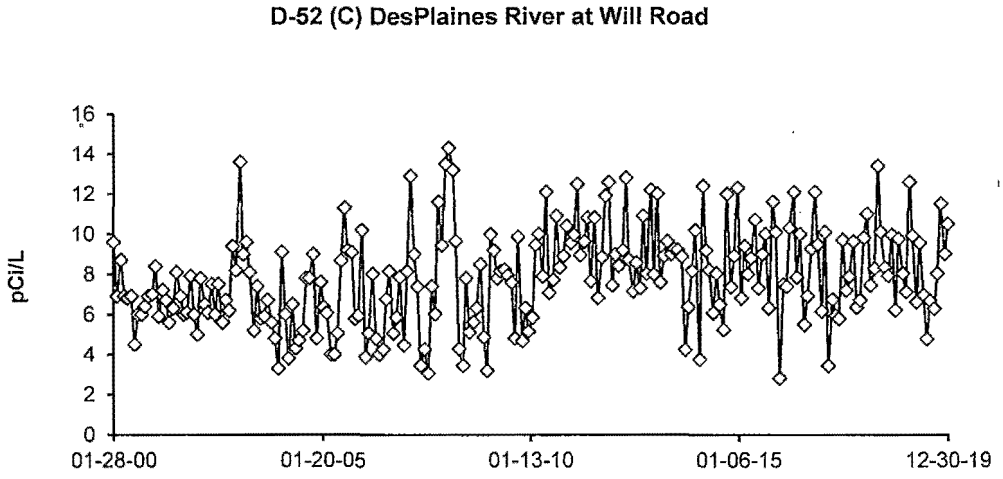
INNER RING STATIONS - D-58, D-101, D-102, D-103, D-104, D-105, D-106, D-107, D-108, D-109, D-110 D-111, D-112A, D-113, D-114, D-115, D-116

OUTER RING STATIONS - D-201, D-202, D-203, D-204, D-205, D-206, D-207, D-208, D-209, D-210, D-211, D-212, D-213, D-214, D-215, D-216

OTHER STATIONS - D-01, D-02, D-03, D-04, D-07, D-08, D-10, D-14, D-45, D-53, D-55, D56

CONTROL STATION - D-12

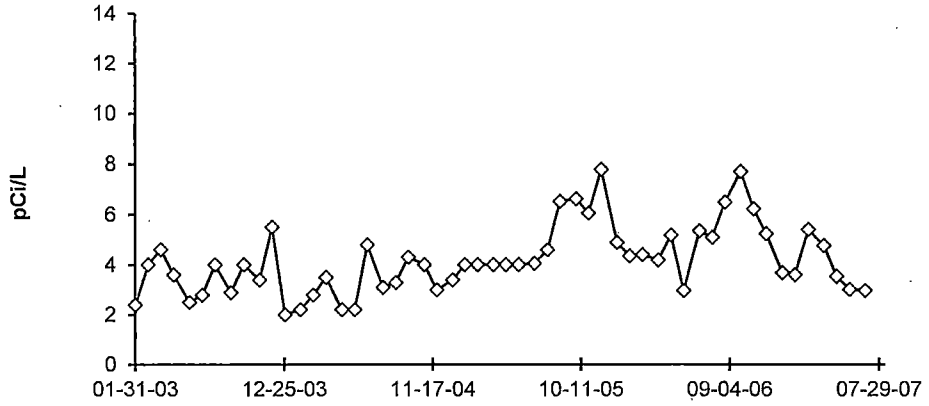
FIGURE C-1
SURFACE WATER - GROSS BETA - STATION D-52 (C)
COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019



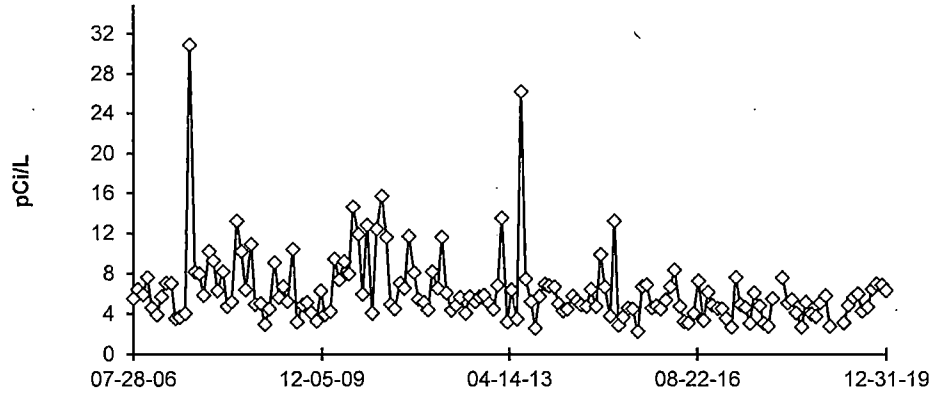
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY 2005

FIGURE C-2
SURFACE WATER - GROSS BETA - STATIONS D-54 (C) AND D-57 (C) COLLECTED IN THE VICINITY OF DNPS, 2003 - 2019

D-54 (C) Kankakee River



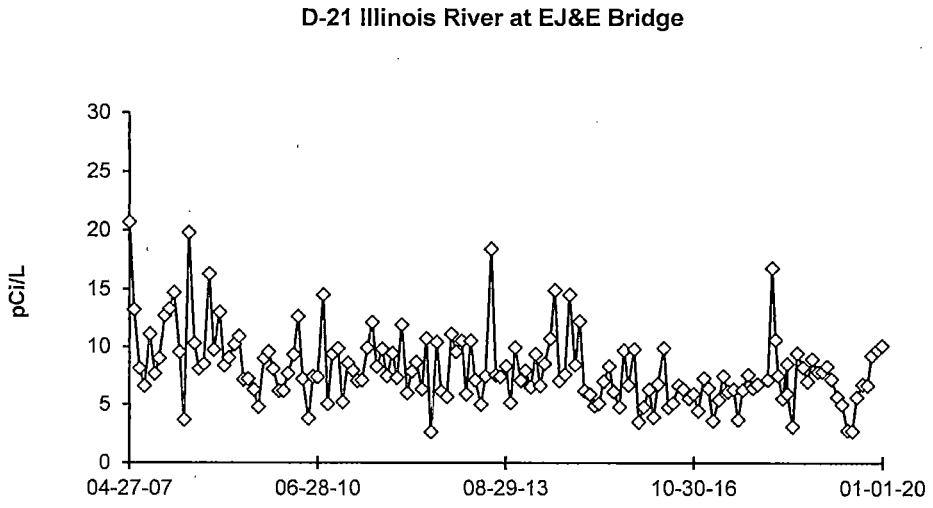
D-57 (C) Kankakee River at Will Road



DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY 2005

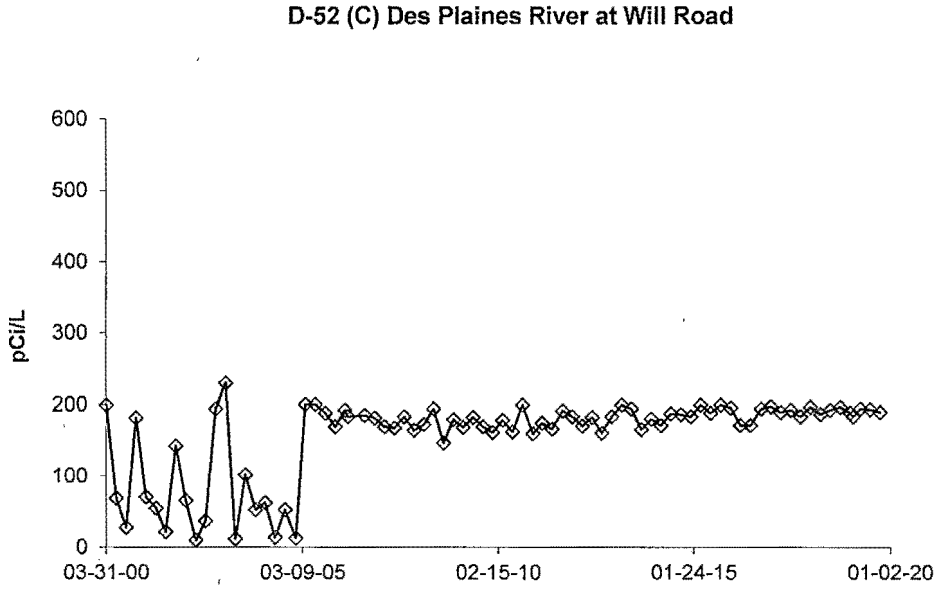
D-54 LOCATION REMOVED FROM PROGRAM JUNE 28, 2007 AND REPLACED WITH D-57

FIGURE C-3
SURFACE WATER - GROSS BETA - STATION D-21
COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019



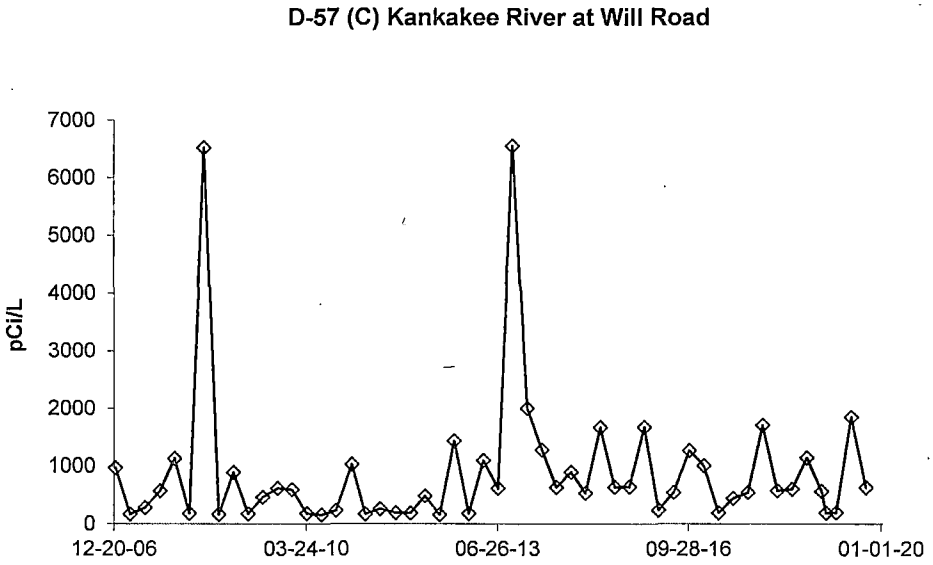
D-21 PLACED INTO SERVICE ON MARCH 30, 2007, REPLACED D-51

FIGURE C-4
SURFACE WATER - TRITIUM - STATION D-52 (C)
COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019



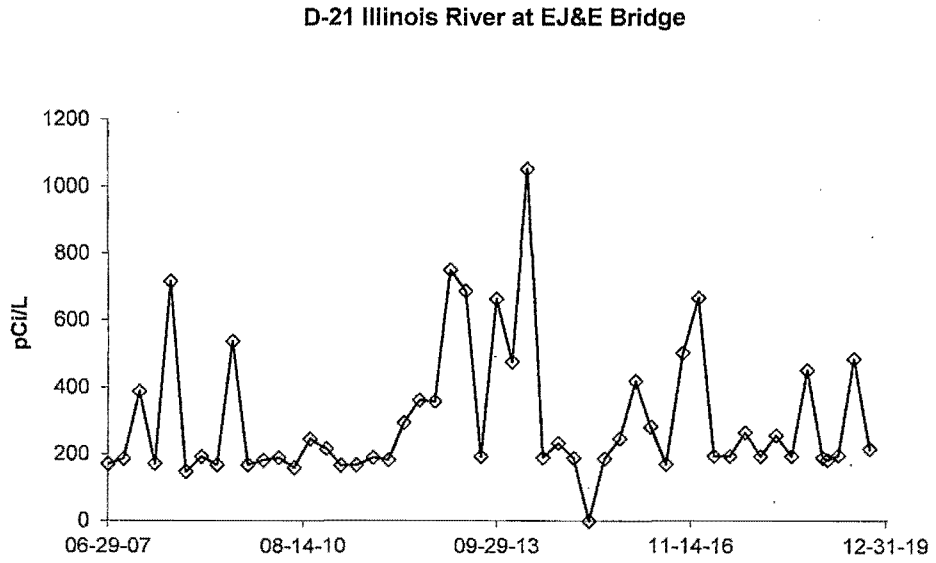
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY 2005

FIGURE C-5
SURFACE WATER - TRITIUM - STATION D-57 (C)
COLLECTED IN THE VICINITY OF DNPS, 2003 - 2019



DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY 2005

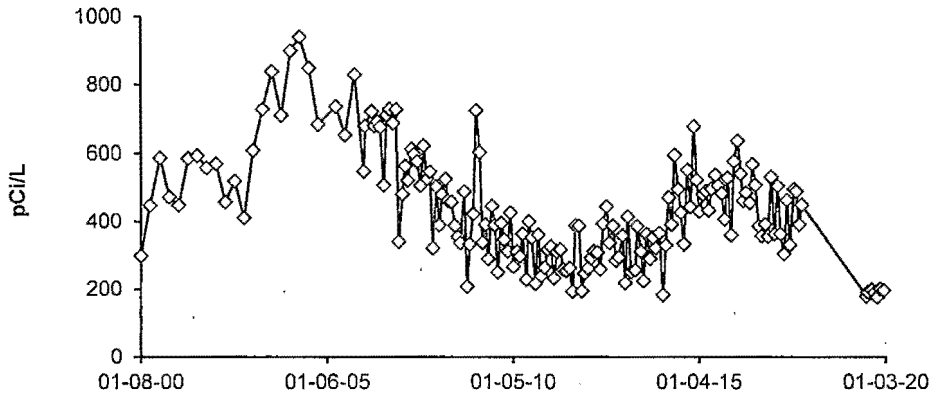
FIGURE C-6
SURFACE WATER - TRITIUM - STATION D-21
COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019



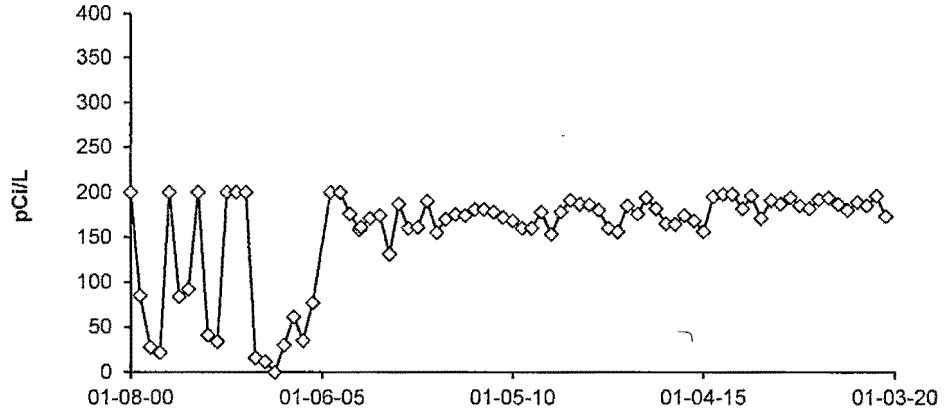
D-21 REPLACED D-51 JUNE 29, 2007

FIGURE C-7
GROUND WATER - TRITIUM - STATIONS D-23 and D-35 COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019

D-23 Thorsen Well



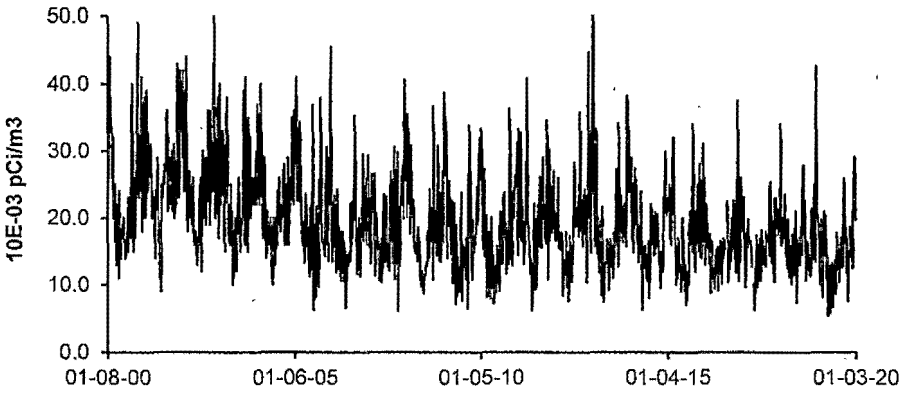
D-35 Dresden Lock and Dam



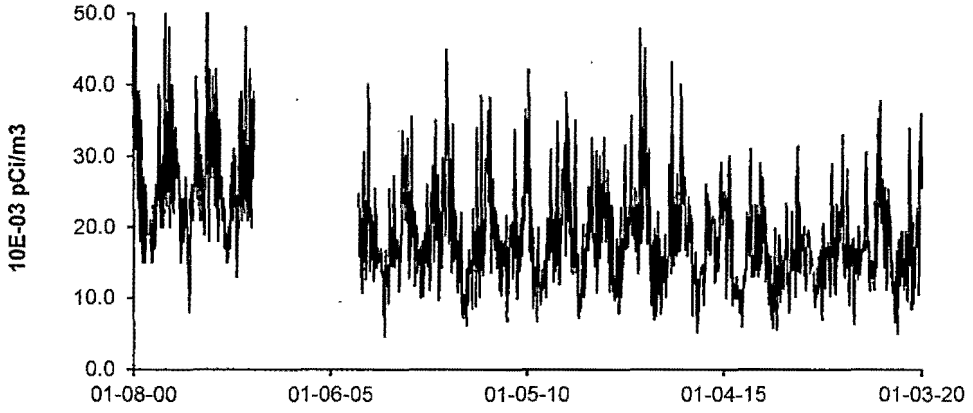
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MCD VALUES AFTER JULY 2005

FIGURE C-8
AIR PARTICULATES - GROSS BETA - STATIONS D-01 and D-02 COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019

D-01 Onsite Station 1



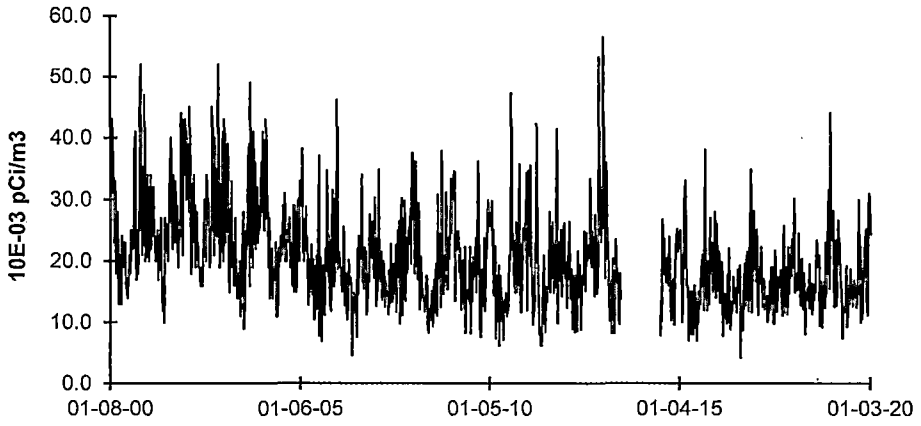
D-02 Onsite Station 2



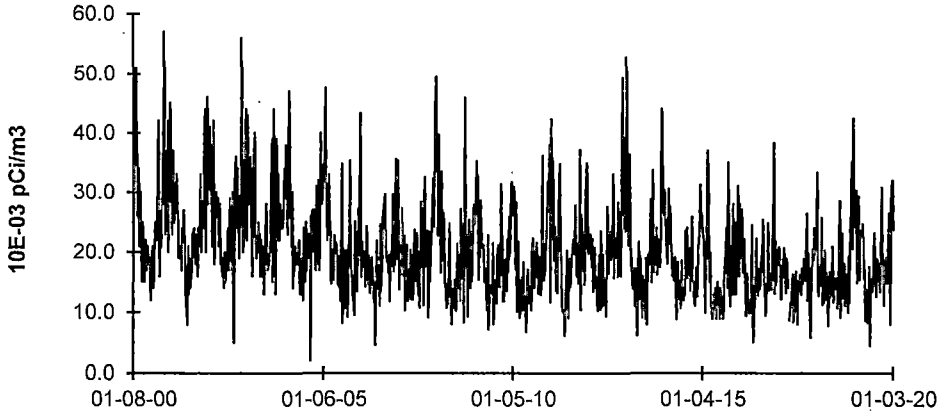
D-02 No samples; power was restored on 09-16-05.

FIGURE C-9
AIR PARTICULATES - GROSS BETA - STATIONS D-03 and D-04 COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019

D-03 Onsite Station 3



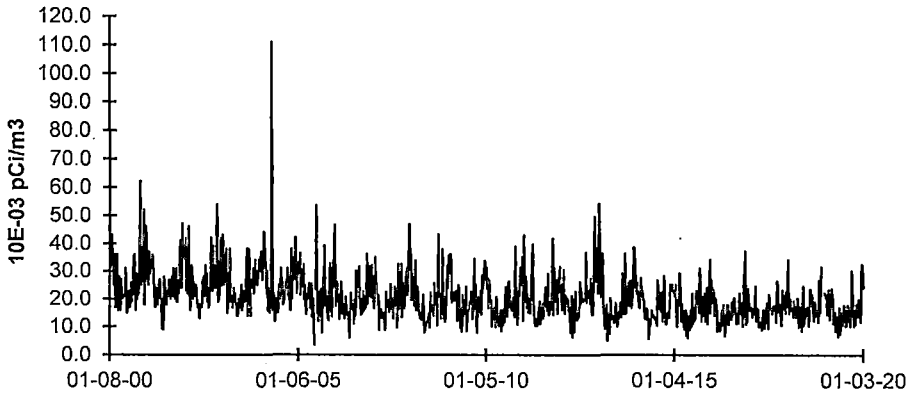
D-04 Collins Road on Station Property



D-03 No samples; power was restored on 07-04-14.

FIGURE C-10
AIR PARTICULATES - GROSS BETA - STATIONS D-07 and D-12 (C) COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019

D-07 Clay Products, Dresden Road



D-12 (C), Quarry Road, Lisbon

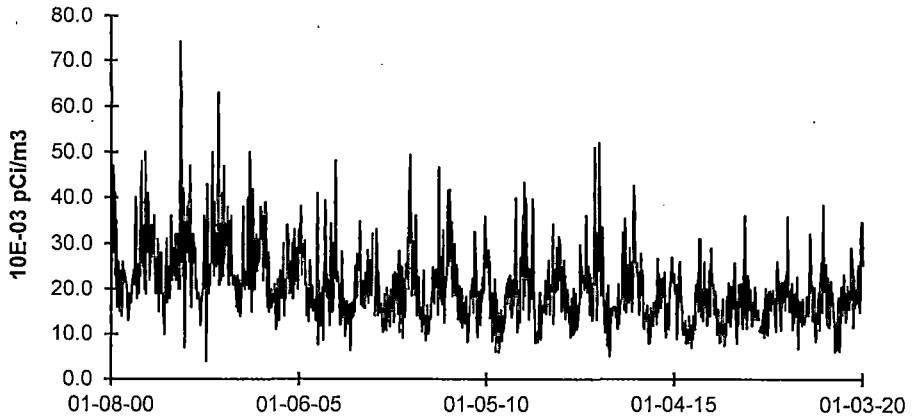
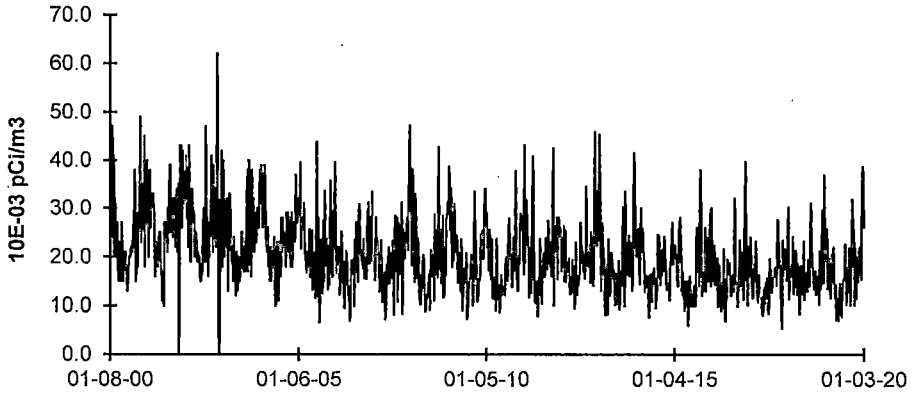


FIGURE C-11
AIR PARTICULATES - GROSS BETA - STATIONS D-45 and D-53 COLLECTED IN THE VICINITY OF DNPS, 2000 - 2019

D-45 McKinley Woods Road, Channahon



D-53 Will Road, Hollyhock

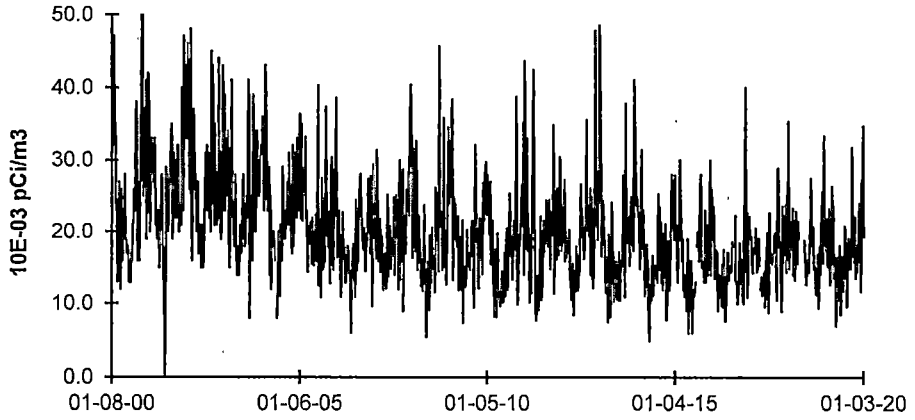
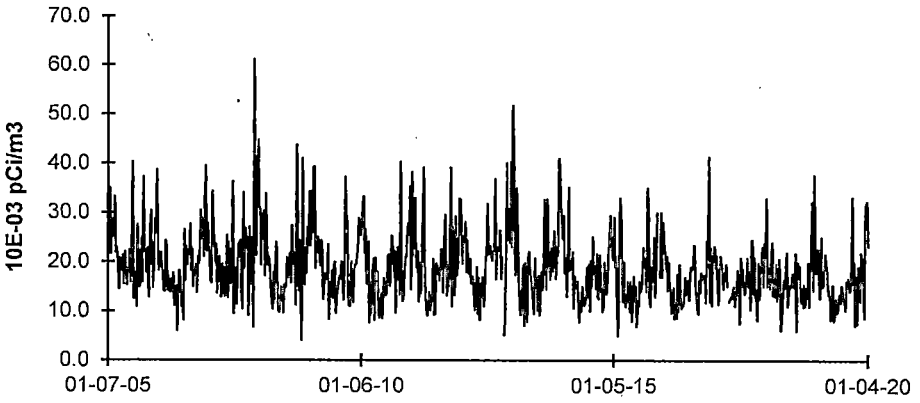


FIGURE C-12
AIR PARTICULATES - GROSS BETA - STATIONS D-08 and D-10 COLLECTED IN THE VICINITY OF DNPS, 2005 - 2019

D-08 Jugtown Road, Prairie Parks



D-10 Goose Lake Road, Goose Lake Village

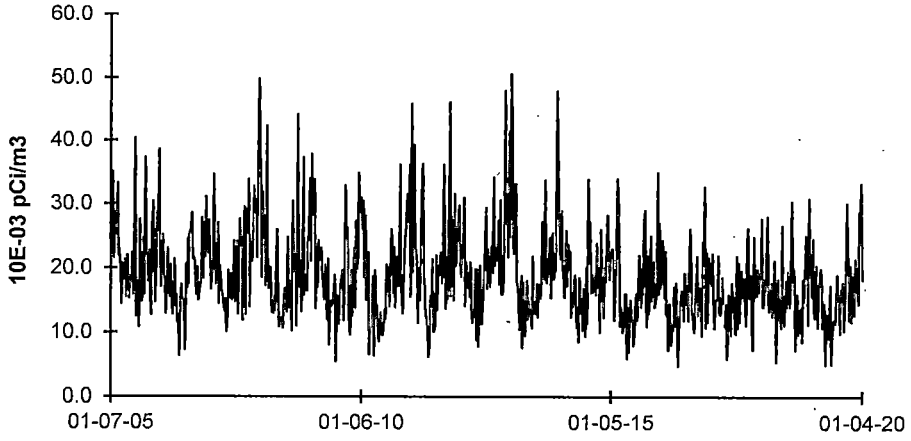


FIGURE C-13
AIR PARTICULATES - GROSS BETA - STATION D-14
COLLECTED IN THE VICINITY OF DNPS, 2005 - 2019

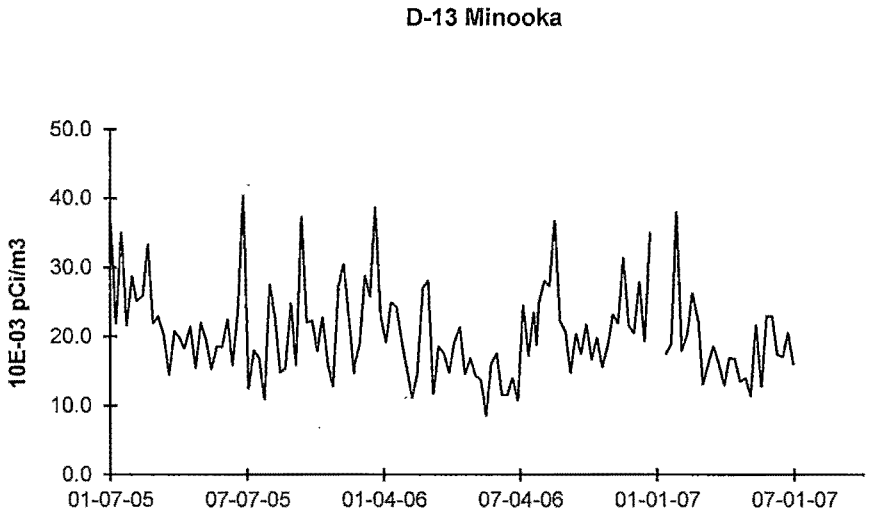
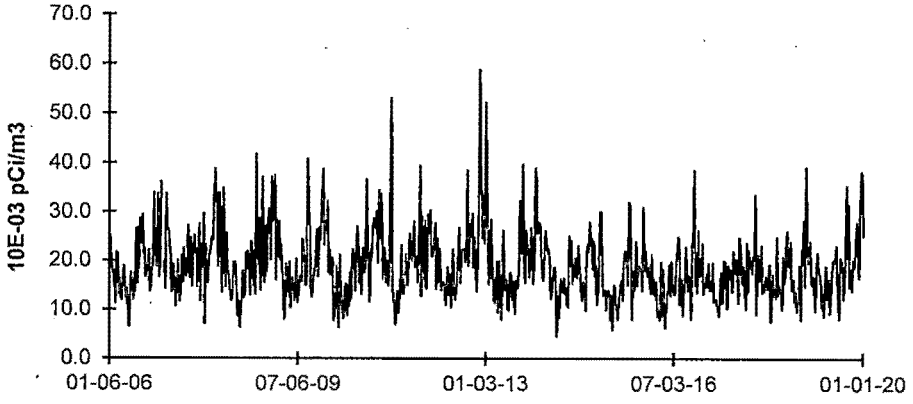
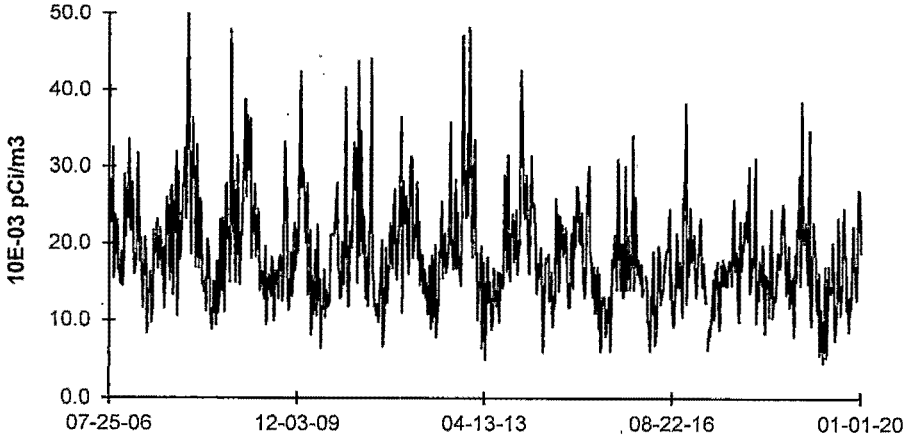


FIGURE C-14
AIR PARTICULATES - GROSS BETA - STATIONS D-55 and D-56 COLLECTED IN THE VICINITY OF DNPS, 2006-2019

D-55 Ridge Road, Minooka

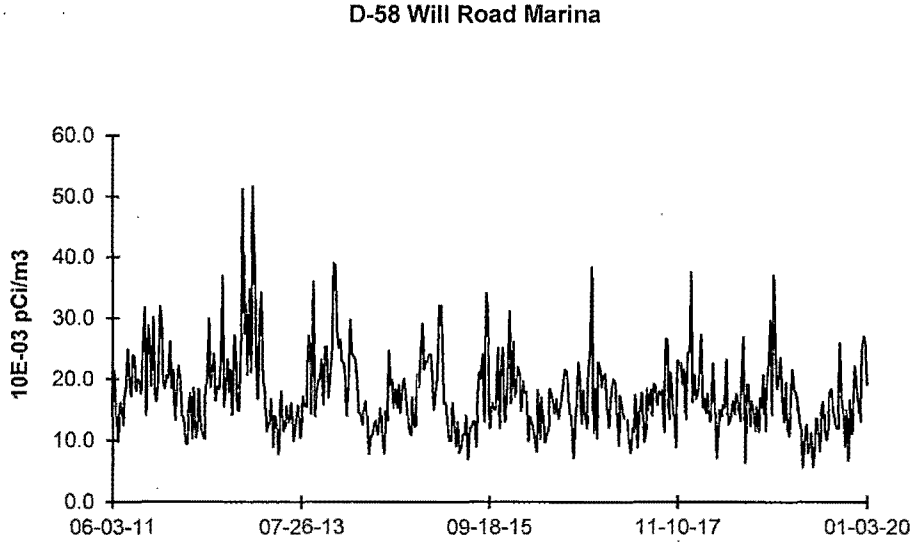


D-56 Will Road, Wildfeather



D-55 NEW STATION DECEMBER 30, 2005 REPLACED D-13 JUNE 29, 2007
D-56 NEW STATION JULY 25, 2006

FIGURE C-15
AIR PARTICULATES - GROSS BETA - STATION D-58
COLLECTED IN THE VICINITY OF DNPS, 2011-2019



D-58 NEW STATION IN MAY OF 2011

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APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

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Table D.1 **Analytics Environmental Radioactivity Cross Check Program**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
March 2019	E12468A	Milk	Sr-89	pCi/L	87.1	96	0.91	A
			Sr-90	pCi/L	12.6	12.6	1.00	A
	E12469A	Milk	Ce-141	pCi/L	113	117	0.97	A
			Co-58	pCi/L	153	143	1.07	A
			Co-60	pCi/L	289	299	0.97	A
			Cr-51	pCi/L	233	293	0.80	A
			Cs-134	pCi/L	147	160	0.92	A
			Cs-137	pCi/L	193	196	0.98	A
			Fe-59	pCi/L	153	159	0.96	A
			I-131	pCi/L	91.5	89.5	1.02	A
			Mn-54	pCi/L	149	143	1.04	A
			Zn-65	pCi/L	209	220	0.95	A
	E12470	Charcoal	I-131	pCi	77.5	75.2	1.03	A
	E12471	AP	Ce-141	pCi	60.7	70.2	0.87	A
			Co-58	pCi	87.9	85.8	1.02	A
			Co-60	pCi	175	179	0.98	A
			Cr-51	pCi	165	176	0.94	A
			Cs-134	pCi	91.2	95.9	0.95	A
			Cs-137	pCi	120	118	1.02	A
			Fe-59	pCi	108	95.3	1.13	A
			Mn-54	pCi	94.2	85.7	1.10	A
			Zn-65	pCi	102	132	0.77	W
	E12472	Water	Fe-55	pCi/L	2230	1920	1.16	A
	E12473	Soil	Ce-141	pCi/g	0.189	0.183	1.03	A
			Co-58	pCi/g	0.209	0.224	0.93	A
			Co-60	pCi/g	0.481	0.466	1.03	A
			Cr-51	pCi/g	0.522	0.457	1.14	A
			Cs-134	pCi/g	0.218	0.250	0.87	A
			Cs-137	pCi/g	0.370	0.381	0.97	A
			Fe-59	pCi/g	0.263	0.248	1.06	A
			Mn-54	pCi/g	0.248	0.223	1.11	A
			Zn-65	pCi/g	0.371	0.344	1.08	A
	E12474	AP	Sr-89	pCi	88.3	95.2	0.93	A
			Sr-90	pCi	11.7	12.5	0.94	A
August 2019	E12562	Soil	Sr-90	pCi/g	4.710	6.710	0.70	W

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on TBE internal QC limits:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

Table D.1 **Analytics Environmental Radioactivity Cross Check Program**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
September 2019	E12475	Milk	Sr-89	pCi/L	70.0	93.9	0.75	W
			Sr-90	pCi/L	12.0	12.9	0.93	A
	E12476	Milk	Ce-141	pCi/L	150	167	0.90	A
			Co-58	pCi/L	170	175	0.97	A
			Co-60	pCi/L	211	211	1.00	A
			Cr-51	pCi/L	323	331	0.98	A
			Cs-134	pCi/L	180	207	0.87	A
			Cs-137	pCi/L	147	151	0.97	A
			Fe-59	pCi/L	156	148	1.05	A
			I-131	pCi/L	81.1	92.1	0.88	A
			Mn-54	pCi/L	160	154	1.04	A
			Zn-65	pCi/L	303	293	1.03	A
	E12477	Charcoal	I-131	pCi	95.9	95.1	1.01	A
	E12478	AP	Ce-141	pCi	129	138	0.93	A
			Co-58	pCi	128	145	0.88	A
			Co-60	pCi	181	174	1.04	A
			Cr-51	pCi	292	274	1.07	A
			Cs-134	pCi	166	171	0.97	A
			Cs-137	pCi	115	125	0.92	A
			Fe-59	pCi	119	123	0.97	A
			Mn-54	pCi	129	128	1.01	A
			Zn-65	pCi	230	242	0.95	A
	E12479	Water	Fe-55	pCi/L	1810	1850	0.98	A
	E12480	Soil	Ce-141	pCi/g	0.305	0.276	1.10	A
			Co-58	pCi/g	0.270	0.289	0.93	A
			Co-60	pCi/g	0.358	0.348	1.03	A
			Cr-51	pCi/g	0.765	0.547	1.40	N[1]
			Cs-134	pCi/g	0.327	0.343	0.95	A
			Cs-137	pCi/g	0.308	0.321	0.96	A
			Fe-59	pCi/g	0.257	0.245	1.05	A
			Mn-54	pCi/g	0.274	0.255	1.07	A
			Zn-65	pCi/g	0.536	0.485	1.11	A
	E12481	AP	Sr-89	pCi	95.9	91.9	1.04	A
			Sr-90	pCi	12.3	12.6	0.97	A
	E12563	Soil	Sr-90	pCi/g	0.392	0.360	1.09	A

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on TBE internal QC limits:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

*(1) See **NCR 19-27***

DOE's Mixed Analyte Performance Evaluation Program (MAPEP)

Table D.2 **Teledyne Brown Engineering Environmental Services**

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Range	Evaluation [b]
February 2019	19-GrF40	AP	Gross Alpha	Bq/sample	0.184	0.528	0.158 - 0.898	A
			Gross Beta	Bq/sample	0.785	0.948	0.474 - 1.422	A
	19-MaS40	Soil	Ni-63	Bq/kg	420	519.0	363 - 675	A
			Sr-90	Bq/kg			*(1)*	NR[3]
	19-MaW40	Water	Am-241	Bq/L	0.764	0.582	0.407 - 0.757	N[4]
			Ni-63	Bq/L	4.72	5.8	4.1 - 7.5	A
			Pu-238	Bq/L	0.443	0.451	0.316 - 0.586	A
			Pu-239/240	Bq/L	-0.00161	0.0045	*(2)*	A
	19-RdF40	AP	U-234/233	Bq/sample	0.1138	0.106	0.074 - 0.138	A
			U-238	Bq/sample	0.107	0.110	0.077 - 0.143	A
	19-RdV40	Vegetation	Cs-134	Bq/sample	2.14	2.44	1.71 - 3.17	A
			Cs-137	Bq/sample	2.22	2.30	1.61 - 2.99	A
			Co-57	Bq/sample	2.16	2.07	1.45 - 2.69	A
			Co-60	Bq/sample	0.02382		*(1)*	A
			Mn-54	Bq/sample	-0.03607		*(1)*	A
			Sr-90	Bq/sample	-0.1060		*(1)*	N[5]
			Zn-65	Bq/sample	1.35	1.71	1.20 - 2.22	W
August 2019	19-GrF41	AP	Gross Alpha	Bq/sample	0.192	0.528	0.158 - 0.898	W
			Gross Beta	Bq/sample	0.722	0.937	0.469 - 1.406	A
	19-MaS41	Soil	Ni-63	Bq/kg	436	629	440 - 818	N[6]
			Sr-90	Bq/kg	444	572	400 - 744	W
	19-MaW41	Water	Am-241	Bq/L				NR[7]
			Ni-63	Bq/L	7.28	9.7	6.8 - 12.6	W
			Pu-238	Bq/L	0.0207	0.0063	*(2)*	A
			Pu-239/240	Bq/L	0.741	0.727	0.509 - 0.945	A
	19-RdF41	AP	U-234/233	Bq/sample	0.0966	0.093	0.065 - 0.121	A
			U-238	Bq/sample	0.0852	0.096	0.067-0.125	A
	19-RdV41	Vegetation	Cs-134	Bq/sample	0.0197		*(1)*	A
			Cs-137	Bq/sample	3.21	3.28	2.30 - 4.26	A
			Co-57	Bq/sample	4.62	4.57	3.20 - 5.94	A
			Co-60	Bq/sample	4.88	5.30	3.71 - 6.89	A
			Mn-54	Bq/sample	4.54	4.49	3.14 - 5.84	A
			Sr-90	Bq/sample	0.889	1.00	0.70 - 1.30	A
			Zn-65	Bq/sample	2.78	2.85	2.00 - 3.71	A

(a) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) DOE/MAPEP evaluation:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) False positive test
(2) Sensitivity evaluation
*(3) See **NCR 19-12***
*(4) See **NCR 19-13***
*(5) See **NCR 19-14***
*(6) See **NCR 19-25***
*(7) See **NCR 19-26***

Table D.3 **ERA Environmental Radioactivity Cross Check Program**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Limits	Evaluation [b]
April 2019	Rad-117	Water	Ba-133	pCi/L	26.3	24.1	18.6 - 27.8	A
			Cs-134	pCi/L	15.2	12.1	8.39 - 14.4	N[1]
			Cs-137	pCi/L	33.6	33.1	28.8 - 39.4	A
			Co-60	pCi/L	11.9	11.5	8.67 - 15.5	A
			Zn-65	pCi/L	87.1	89.2	80.3 - 107	A
			GR-A	pCi/L	19	19.3	9.56 - 26.5	A
			GR-B	pCi/L	20.2	29.9	19.1 - 37.7	A
			U-Nat	pCi/L	55.5	55.9	45.6 - 61.5	A
			H-3	pCi/L	21500	21400	18700 - 23500	A
			Sr-89	pCi/L	44.9	33.3	24.5 - 40.1	N[2]
			Sr-90	pCi/L	24.5	26.3	19.0 - 30.7	A
			I-131	pCi/L	28.9	28.4	23.6 - 33.3	A
October 2019	Rad-119	Water	Ba-133	pCi/L	42.7	43.8	35.7 - 48.8	A
			Cs-134	pCi/L	53.5	55.9	45.2 - 61.5	A
			Cs-137	pCi/L	77.7	78.7	70.8 - 89.2	A
			Co-60	pCi/L	51.5	53.4	48.1 - 61.3	A
			Zn-65	pCi/L	36.6	34.0	28.5 - 43.1	A
			GR-A	pCi/L	40.5	27.6	14.0 - 36.3	N[3]
			GR-B	pCi/L	36.3	39.8	26.4 - 47.3	A
			U-Nat	pCi/L	27.66	28.0	22.6 - 31.1	A
			H-3	pCi/L	22800	23400	20500 - 25700	A
			Sr-89	pCi/L	47.1	45.5	35.4 - 52.7	A
			Sr-90	pCi/L	32.5	26.5	19.2 - 30.9	N[4]
			I-131	pCi/L	26.0	23.9	19.8 - 28.4	A
December 2019	QR 120419D	Water	Sr-90	pCi/L	20.1	18.6	13.2 - 22.1	A

(a) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(b) ERA evaluation:

A = Acceptable - Reported value falls within the Acceptance Limits

N = Not Acceptable - Reported value falls outside of the Acceptance Limits

*(1) See **NCR 19-10***

*(2) See **NCR 19-11***

*(3) See **NCR 19-23***

*(4) See **NCR 19-24***

APPENDIX E

ERRATA DATA

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There was no errata data for 2019.

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APPENDIX F

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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Docket No: 50-010
50-237
50-249

DRESDEN NUCLEAR POWER STATION
UNITS 1, 2 and 3

Annual Radiological
Groundwater Protection Program Report

1 January through 31 December 2019

Prepared By
Teledyne Brown Engineering
Environmental Services

Exelon Generation®

Dresden Nuclear Power Station
Morris, IL 60450

May 2020

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Table of Contents

Appendices

I. Summary and Conclusions

Dresden Station is situated on approximately 600 acres of land that borders the Illinois River to the north and the Kankakee River to the east. This land is referred to as the owner-controlled area. The Dresden power plant itself takes up a small parcel of the owner-controlled area and is surrounded by a security fence. The security fence defines what is known as the Protected Area (PA).

The Dresden power plant has experienced leaks from underground lines and spills from systems containing radioactive water over its 50-year history. These incidents have created a number of areas of localized contamination within the PA. The liquid scintillation analyses of groundwater in many of these areas show measurable concentrations of tritium (H-3).

Dresden participated in a fleetwide hydrogeologic investigation in during the summer of 2006 in an effort to characterize groundwater movement at each site. This investigation also compiled a list of the historic spills and leaks as well as a detailed analysis on groundwater hydrology for Dresden Nuclear Generation Station. Combining the tritium concentration in a locally contaminated area with the speed and direction of groundwater in the vicinity can produce a contaminated groundwater plume projection. If the plume of contaminated groundwater passes through the path of a groundwater monitoring well, it can be anticipated that the tritium concentration in this well will increase to some maximum concentration, then decrease over time.

The fleetwide Hydrogeologic Investigation Report (HIR) shows that groundwater movement on the Dresden site is very slow. In addition, there is a confining rock layer, the Maquoketa Shale layer, about 55 feet below the surface that impedes groundwater movement below this depth.

Dresden has a domestic water system that is supplied by two deep wells (1500 feet deep) that were installed about 50 years ago south of the PA. Samples taken from domestic water supply have never shown any detectable tritium concentration.

Tritium has a half-life of 12.3 years. This means that 40 years from now 90% of the tritium on site today will have decayed away to more stable elements. Given the limited volume of contaminated groundwater on site, radioactive decay, slow groundwater movement, and dilution effects, the conclusion of the HIR is that the operation of Dresden Nuclear Power Station has no adverse radiological impact on the environment. As a result there is little potential for contaminated groundwater on site to affect off-site drinking water.

II. Introduction

Radiological Groundwater Monitoring Program (RGPP):

Dresden has a Radiological Groundwater Monitoring Program (RGPP) that provides long-term monitoring intended to verify the fleet-wide hydrogeologic study conclusions. Dresden uses developed groundwater wells and surface water sample points in the RGPP.

The Dresden RGPP was established in 2006 and there have been no significant changes to this program. This program does not impact the operation of the plant and is independent of the REMP.

Developed groundwater wells are wells that were installed specifically for monitoring groundwater. These wells are equipped with screens and are properly sealed near the surface to avoid surface water intrusion. The wells were designed in accordance with appropriate codes and developed in accordance with appropriate standards and procedures. Dresden has groundwater monitoring wells identified as "shallow" (depths from 15 to 35 feet), "Intermediate" (depths from 35 to 55 feet) and "deep" (depths beyond 100 feet). All wells installed to a depth greater than 100 feet ("deep" wells) were found to be dry and removed from the RGPP. Surface water sample points are identified sample locations in the station's canals and cooling pond.

There are 96 sampling points in the RGPP:

Dresden has 47 developed groundwater monitoring wells within the Protected Area (PA). Some of these wells form a ring just inside the security fence and the remaining wells were installed near underground plant system piping that contains radioactive water.

Dresden has 30 developed groundwater monitoring wells outside the PA the majority of which form a ring just within the perimeter of the property.

Dresden has 12 surface water monitoring locations on the owner-controlled area sampled as part of the Dresden RGPP. Three of these locations are monitored for level only and have no analyses in the accompanying tables.

Dresden has 4 precipitation water monitoring locations sampled as part of the Dresden RGPP. An additional 8 locations were studied in 2011 through 2012, but only 4 locations are currently permanently a part of the RGPP program.

Dresden has 1 sentinel well and 2 CST leak detection valves. These 3 sampling points are not constructed to code or developed to a standard. These sampling points are idle and only used for qualitative troubleshooting.

The Dresden site-specific RGPP procedure identifies the historic 'events' that would affect the individual RGPP sample results. This procedure identifies threshold values for each sample point, which if exceeded, could be an indication of a new spill from an above ground system or a new leak in an underground pipe containing tritiated water.

The RGPP sample points are currently sampled on a frequency determined by the well detection category in accordance with site document EN-DR-408-4160, Dresden RGPP Reference Material. During 2019, there were 586 analyses that were performed on 308 samples from 79 sampling points.

Sentinel Wells, sometimes referred to as "baby wells" are wells that were installed to monitor local shallow groundwater; typically in associated with a historic underground pipe leak. These wells are not constructed to code or developed to a standard. Most sentinel wells are from 6 to 12 feet deep and consist of 2" PVC pipe without screens. These wells are categorized as idle wells and are used only for troubleshooting purposes.

Dresden has two basic storm water runoff sewer systems within the P.A: one storm-system routes to the east, then north and discharges into the Unit 1 intake canal, the second storm-system routes to the west, then north, through a large Oil/Water Separator and discharges to the hot canal. Both the Unit 1 intake canal and the hot canal eventually route to the cooling pond. The Dresden Station RGPP has twelve RGPP surface water sampling points to monitor these systems.

A. Objectives of the RGPP

The Objective of the RGPP is to provide long-term monitoring intended to verify the fleet-wide hydrogeologic study conclusions. The objective of the site-specific RGPP is to provide indication of short-term changes to groundwater tritium concentrations within the PA.

If isotopic results of groundwater samples exceed the thresholds specified in this procedure it could be an indication of a new spill from an above ground system or a new leak in an underground pipe containing tritiated water.

Specific Objectives include:

1. Perform routine water sampling and radiological analysis of water from selected locations.

2. Report new leaks, spills, or other detections with potential radiological significance to stakeholders in a timely manner.

3. Regularly assess analytical results to identify adverse trends.

4. Take necessary corrective actions to protect groundwater resources.

B. Implementation of the Objectives

1. Dresden Nuclear Power Station will continue to perform routine sampling and radiological analysis of water from selected locations.

2. Dresden Nuclear Power Station has implemented procedures to identify and report new leaks, spills, or other detections with potential radiological significance in a timely manner.

3. Dresden Nuclear Power Station staff and consulting hydrogeologist assess analytical results on an ongoing basis to identify adverse trends.

4. If an adverse trend in groundwater monitoring analytical results is identified, further investigation will be undertaken. If the investigation identifies a leak or unidentified spill, corrective actions will be implemented.

C. Program Description

Dresden has a Radiological Groundwater Monitoring Program (RGPP) that provides long-term monitoring intended to verify the fleet-wide hydrogeologic study conclusions. Dresden uses 89 developed groundwater wells and surface water sample points in the RGPP.

1. Sample Collection

Sample locations can be found in Table A–1, Appendix A.

Groundwater and Surface Water

Water samples are collected in accordance with the schedule delineated in the Dresden site-specific RGPP procedures. Analytical laboratories are subject to internal quality assurance programs, industry crosscheck programs, as well as nuclear industry audits. Station personnel review and evaluate the analytical results.

D. Characteristics of Tritium (H-3)

Tritium (chemical symbol H-3) is a radioactive isotope of hydrogen. The most common form of tritium is tritium oxide, which is also called "tritiated

water." The chemical properties of tritium are essentially those of ordinary hydrogen.

Tritiated water behaves the same as ordinary water in both the environment and the body. Tritium can be taken into the body by drinking water, breathing air, eating food, or absorption through skin. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted primarily through urine with a clearance rate characterized by an effective biological half-life of about 14 days. Within one month or so after ingestion, essentially all tritium is cleared. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period.

Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity and in special production reactors, where the isotopes lithium-7 and/or boron-10 are activated to produce tritium. Like normal water, tritiated water is colorless and odorless. Tritiated water behaves chemically and physically like non-tritiated water in the subsurface and therefore tritiated water will travel at the same velocity as the average groundwater velocity.

Tritium has a half-life of approximately 12.3 years. It decays spontaneously to helium-3 (3He). This radioactive decay releases a beta particle (low-energy electron). The radioactive decay of tritium is the source of the health risk from exposure to tritium. Tritium emits very weak radiation and leaves the body relatively quickly. Since tritium is almost always found as water it goes directly into soft tissues and organs. The associated dose to these tissues is generally uniform and is dependent on the water content of the specific tissue.

III. Program Description

A. Sample Analysis

This section describes the general analytical methodologies used by Teledyne Brown Engineering (TBE) to analyze the environmental samples for radioactivity for the Dresden Nuclear Power Station RGPP in 2019.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of gamma emitters in groundwater and surface water.

2. Concentrations of strontium in groundwater.

3. Concentrations of tritium in groundwater, surface water and precipitation water.

4. Concentrations of gross alpha and gross beta in groundwater.

5. Concentrations of Am-241 in groundwater.

6. Concentrations of Cm-242 and Cm-243/244 in groundwater.

7. Concentrations of Pu-238 and Pu-239/240 in groundwater.

8. Concentrations of U-233/234, U-235 and U-238 in groundwater.

9. Concentrations of Fe-55 in groundwater.

10. Concentrations of Ni-63 in groundwater.

B. Data Interpretation

The radiological data collected prior to Dresden Nuclear Power Station becoming operational were used as a baseline with which these operational data were compared. For the purpose of this report, Dresden Nuclear Power Station was considered operational at initial criticality. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

   The Lower Limit of Detection (LLD) is the minimum sensitivity value that must be achieved routinely by the analytical parameter.

2. Laboratory Measurements Uncertainty

   The estimated uncertainty in measurement of tritium in environmental samples is frequently on the order of 50% of the measurement value.

   Statistically, the exact value of a measurement is expressed as a range with a stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from calibration standards, sample volume or weight measurements, sampling uncertainty and other factors. Exelon Generation, LLC reports the uncertainty of a measurement created by statistical process (counting error) as well as all sources of error (Total Propagated Uncertainty or TPU). Each result has two values

calculated. Exelon Generation, LLC reports the TPU by following the result with plus or minus ± the estimated sample standard deviation as TPU that is obtained by propagating all sources of analytical uncertainty in measurements.

Analytical uncertainties are reported at the 95% confidence level in this report for reporting consistency with the AREOR.

Gamma spectroscopy results for each type of sample were grouped as follows:

For groundwater and surface water 14 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140 were reported.

C. Background Analysis

A pre-operational radiological environmental monitoring program (pre-operational REMP) was conducted to establish background radioactivity levels prior to operation of the Station. The environmental media sampled and analyzed during the pre-operational REMP were atmospheric radiation, fall-out, domestic water, surface water, marine life, and food stuffs. The results of the monitoring were detailed in the report entitled, Environmental Radiological Monitoring for Dresden Nuclear Power Nuclear Power Station, Commonwealth Edison Company, Annual Report 1986, May 1987.

1. Background Concentrations of Tritium

The purpose of the following discussion is to summarize background measurements of tritium in various media performed by others. Additional detail may be found by consulting references (CRA 2006).

a. Tritium Production

Tritium is created in the environment from naturally-occurring processes both cosmic and subterranean, as well as from anthropogenic (i.e., man-made) sources. In the upper atmosphere, "Cosmogenic" tritium is produced from the bombardment of stable nuclides and combines with oxygen to form tritiated water, which will then enter the hydrologic cycle. Below ground, "lithogenic" tritium is produced by the bombardment of natural lithium present in crystalline rocks by neutrons produced by the radioactive decay of naturally abundant uranium and thorium. Lithogenic production of tritium is usually

negligible compared to other sources due to the limited abundance of lithium in rock. The lithogenic tritium is introduced directly to groundwater.

A major anthropogenic source of tritium and strontium-90 comes from the former atmospheric testing of thermonuclear weapons. Levels of tritium in precipitation increased significantly during the 1950s and early 1960s, and later with additional testing, resulting in the release of significant amounts of tritium to the atmosphere. The Canadian heavy water nuclear power reactors, other commercial power reactors, nuclear research, and weapons production continue to influence tritium concentrations in the environment.

b. Precipitation Data

Precipitation samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provide tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected worldwide from 1960 to 2006. RadNet provides tritium precipitation concentration data for samples collected at stations throughout the U.S. from 1960 up to and including 2006. Based on GNIP data for sample stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons.

Tritium concentrations in surface water showed a sharp decline up until 1975 followed by a gradual decline since that time. Tritium concentrations in Midwest precipitation have typically been below 100 pCi/L since around 1980.

Tritium concentrations in wells may still be above the 200-pCi/L detection limit from the external causes described above. Water from previous years and decades is naturally captured in groundwater, so some well water sources today are affected by the surface water from the 1960s that was elevated in tritium.

c. Surface Water Data

Tritium concentrations are routinely measured in large surface water bodies, including Lake Michigan and the Mississippi River.

Illinois surface water data were typically less than 100 pCi/L.

The radio-analytical laboratory is counting tritium results to an Exelon Generation, LLC specified LLD of 200 pCi/L. Typically, the lowest positive measurement will be reported within a range of 40 – 240 pCi/L or 140 ± 100 pCi/L. These sample results cannot be distinguished as different from background at this concentration.

IV. Results and Discussion

Dresden Station initiated a Radiological Groundwater Protection Program (RGPP) in 2006.

A. Groundwater Results

Groundwater

Samples were collected from on-site wells throughout the year in accordance with Dresden's RGPP. Analytical results and anomalies are discussed below:

Tritium

Following historic ground tritium-contamination events at Dresden Station routine sampling and analyses continue, both inside and outside the protected area, in accordance with site procedure EN-DR-408-4160, Dresden Station RGPP Reference Material.

Low level tritium was detected from January through December 2019 in several sampling and testing locations (Table B-I.1, Appendix B); however, overall tritium concentrations have been trending down.

The vast majority of these locations showed a range of tritium contamination from LLD to values less than 20,000 pCi/L.

MD-11 and MW-DN-124-I were the only 2 locations with tritium concentrations above 20,000 pCi/L. The highest level ever reached during calendar year 2019 was 40,700 pCi/L by MD-11 (sample collected on 08/28/2019).

It is important to note that wells that exceed the United States Environmental Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission Reporting Limit) of 20,000 pCi/L were due to the 2014 2/3B CST Leak. The exceedances are located within Station property, and do not serve as a drinking water source.

Strontium

Samples were collected and analyzed for Sr-89 and Sr-90 activity (Table B-I.1, Appendix B). Sr-89 was not detected in any of the samples. Sr-90 was detected in 4 samples at locations MW-DN-105S and DSP-108. The concentrations ranged from 1.9 to 2.6 pCi/L.

Gross Alpha and Gross Beta (dissolved and suspended)

Most Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the second quarter of 2019 (Table B-I.1, Appendix B). Gross Alpha (dissolved) was detected in 3 groundwater locations with concentrations ranging from 2.2 to 8.8 pCi/L. Gross Alpha (suspended) was detected in 7 groundwater locations with concentrations ranging from 1.9 to 7.3 pCi/L. Gross Beta (dissolved) was detected at 34 of the groundwater locations. The concentrations ranged from 5.8 to 78.6 pCi/L. Gross Beta (suspended) was detected in 6 groundwater locations with concentrations ranging from 2.9 to 11.6 pCi/L. The concentrations of Gross Alpha and Gross Beta, which are slightly above detectable levels, are considered to be background and are not the result of plant effluents.

Gamma Emitters

Only naturally-occurring nuclides were detected in 2 samples. No other gamma-emitting nuclides were detected (Table B-I.2, Appendix B).

Hard-To-Detects

Hard-To-Detect analyses were performed on 6 groundwater locations to establish background levels. The analyses included Fe-55, Ni-63, Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-233/234, U-235 and U-238. U-233/234 was detected at MW-DN-101-I with concentrations ranging from 0.28 to 0.53 pCi/L. U-238 was detected at MW-DN-101-I with concentrations ranging from 0.20 to 0.22 pCi/L. (Table B-I.3, Appendix B). Ni-63 was detected in samples taken at MW-DN-101-I and MW-DN-119-I. The concentrations ranged from 7.2 to 32.0 pCi/L. All other hard-to-detect nuclides were not detected at concentrations greater than their respective MDCs.

B. Surface Water Results

Surface Water

Samples were collected from 6 surface water locations throughout the

year in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below:

Tritium

Samples from all locations were analyzed for tritium activity (Table B-II.1, Appendix B). Tritium values ranged from the detection limit to 1,800 pCi/L. The measurable concentrations of tritium are from an upstream source.

Gamma Emitters

No gamma-emitting nuclides were detected in any surface water samples. (Table B-II.2, Appendix B)

C. Precipitation Water Results

Precipitation Water

Samples were collected from 4 precipitation water locations throughout the year in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below.

Tritium

Samples from 4 locations were analyzed for tritium activity (Table B-III.1, Appendix B). Tritium was not detected in any samples.

D. Drinking Water Well Survey

No drinking water well surveys were conducted in 2019.

E. Summary of Results – Inter-Laboratory Comparison Program

Inter-Laboratory Comparison Program results for TBE are presented in the AREOR.

F. Leaks, Spills, and Releases

No leaks, spills, and releases occurred in 2019.

G. Trends

Overall, tritium concentrations are decreasing across the Station. The Station continued to implement the tritium monitoring plan with

monthly/quarterly sampling of a subset of shallow and intermediate aquifer wells, sewage treatment plant water, and storm sewer water.

An elevated concentration persists in the area of the Condensate Storage Tanks (Event 20 in EN-DR-408-4160, Revision 6, Attachment 3). As of December 2015, active remediation was implemented. Two remediation wells were installed in August 2015, however, the West remediation well is capable of enough recharge for active remediation.

H. Investigations

No investigations performed in 2019.

I. Actions Taken

1. Compensatory Actions

None.

2. Actions to Recover/Reverse Plumes

In August 2015, two remediation wells were installed by the CSTs. The intent is to pump tritiated water out of the ground. The water is processed through the liquid radwaste system. Active remediation was initiated in December 2015. Remediation continued through 2017.

APPENDIX A

LOCATION DESIGNATION

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TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Dresden Nuclear Power Station, 2019

Site	Site Type	Location
DSP-105	Monitoring Well	30 feet east of the east wall of the EM Shop
DSP-106	Monitoring Well	65 feet east of east wall of EM Shop
DSP-107	Monitoring Well	9 feet east of the east Unit 1 Fuel Pool wall
DSP-108	Monitoring Well	40 ft east of the Unit 1 Sphere
DSP-117	Monitoring Well	Northeast of Unit 1 Sphere; 825 feet west of Ross Bridge
DSP-121	Monitoring Well	72 feet north of 2/3 Intake Canal fence
DSP-122	Monitoring Well	50 feet north of the Radwaste Tank Farm
DSP-123	Monitoring Well	Northeast corner of the Unit 1 Off-gas Building
DSP-124	Monitoring Well	9 feet south of Floor Drain Collector Tank
DSP-125	Monitoring Well	Northeast corner of the Unit 2/3A CST
DSP-126	Monitoring Well	21 feet northwest of the northwest bend in road behind Training Building
DSP-147	Monitoring Well	325 feet west of Telemetry Bridge
DSP-148	Monitoring Well	130 feet southeast of the Flow Regulating Station building
DSP-149R	Monitoring Well	35 feet south by southwest of the 138 KV yard fence
DSP-150	Monitoring Well	85 feet east of the northeast corner of the Unit 1 Spent Fuel Pool pad
DSP-151	Monitoring Well	65 feet north of the northeast corner of the Storeroom
DSP-152	Monitoring Well	210 feet south by southeast of the southeast corner of Maintenance Garage
DSP-153	Monitoring Well	150 feet east of the southeast corner of liquid hydrogen tank farm fence
DSP-154	Monitoring Well	33 feet west of the track; 165 feet east of the Security Checkpoint
DSP-156	Monitoring Well	70 feet east by northeast of the northwest corner of 138 KV yard fence
DSP-157-I	Monitoring Well	25 feet south of the south edge of the Employee Parking lot
DSP-157-M	Monitoring Well	25 feet south of the south edge of the Employee Parking lot
DSP-157-S	Monitoring Well	25 feet south of the south edge of the Employee Parking lot
DSP-158-I	Monitoring Well	53 feet west of the Kankakee River; 33 feet west of the cinder track
DSP-158-M	Monitoring Well	53 feet west of the Kankakee River; 33 feet west of the cinder track
DSP-158-S	Monitoring Well	50 feet west of the Kankakee River; 33 feet west of the cinder track
DSP-159-I	Monitoring Well	250 feet west of the Thorsen house; 450 ft south of the plant access gate
DSP-159-M	Monitoring Well	250 feet west of the Thorsen house; 450 ft south of the plant access gate
DSP-159-S	Monitoring Well	251 feet west of the Thorsen house; 450 ft south of the plant access gate
MW-DN-101-I	Monitoring Well	60 feet north of the Unit 1 Diesel Fuel Storage
MW-DN-101-S	Monitoring Well	60 feet north of the Unit 1 Diesel Fuel Storage
MW-DN-102-I	Monitoring Well	12 feet south of the southeast corner of the MUDS Building
MW-DN-102-S	Monitoring Well	13 feet south of the southeast corner of the MUDS Building
MW-DN-103-I	Monitoring Well	280 feet west of the northwest corner of N-GET Building
MW-DN-103-S	Monitoring Well	281 feet west of the northwest corner of N-GET Building
MW-DN-104-S	Monitoring Well	50 feet north of Radwaste Tank Farm
MW-DN-105-S	Monitoring Well	65 feet north of the northeast corner of the Storeroom
MW-DN-106-S	Monitoring Well	75 feet north of the 2/3 Intake Canal fence; east of the Unit 1 Intake Canal
MW-DN-107-S	Monitoring Well	15 feet west by southwest of the Unit 1 CST
MW-DN-108-I	Monitoring Well	7 feet southwest of the southwest corner of the Unit 1 Cribhouse
MW-DN-109-I	Monitoring Well	8 feet north of Chemistry Building
MW-DN-109-S	Monitoring Well	8 feet north of Chemistry Building
MW-DN-110-I	Monitoring Well	25 feet west of the Waste Water Treatment (WWT) Building
MW-DN-110-S	Monitoring Well	25 feet west of the Waste Water Treatment (WWT) Building
MW-DN-111-S	Monitoring Well	9 feet east of the Floor Drain Collector Tank
MW-DN-112-I	Monitoring Well	100 feet south of the Chemistry Building
MW-DN-112-S	Monitoring Well	100 feet south of the Chemistry Building
MW-DN-113-I	Monitoring Well	90 feet west of the southwest corner of the Administration Building
MW-DN-113-S	Monitoring Well	91 feet west of the southwest corner of the Administration Building
MW-DN-114-I	Monitoring Well	50 feet east of the Unit 1 Clean Demineralized Water Tank
MW-DN-114-S	Monitoring Well	8 feet southwest of the Radiation protection Dept west access doors
MW-DN-115-I	Monitoring Well	11 feet south of Instrument Maintenance Shop
MW-DN-115-S	Monitoring Well	12 feet south of Instrument Maintenance Shop
MW-DN-116-I	Monitoring Well	75 feet south of the Calgon Building roll-up door
MW-DN-116-S	Monitoring Well	75 feet south of the Calgon Building roll-up door
MW-DN-117-I	Monitoring Well	35 feet east by northeast of the Unit 1 Stack
MW-DN-118-S	Monitoring Well	Southeast corner of the Unit 1 Fuel Pool
MW-DN-119-I	Monitoring Well	20 feet east by northeast of the Unit 1 Sewage Ejector Building

TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Dresden Nuclear Power Station, 2019

Site	Site Type	Location
MW-DN-119-S	Monitoring Well	21 feet east by northeast of the Unit 1 Sewage Ejector Building
MW-DN-120-I	Monitoring Well	45 feet north by northeast of the Ross Bridge railing
MW-DN-120-S	Monitoring Well	46 feet north by northeast of the Ross Bridge railing
MW-DN-121-S	Monitoring Well	7 feet west of the dirt road; 42 feet east of the 345KV yard fence
MW-DN-122-I	Monitoring Well	150 feet north of Collins Road; northeast of the G.E. Fuel Storage Facility
MW-DN-122-S	Monitoring Well	150 feet north of Collins Road; northeast of the G.E. Fuel Storage Facility
MW-DN-123-I	Monitoring Well	400 feet west of the Thorsen house; west of the Cold Canal
MW-DN-123-S	Monitoring Well	400 feet west of the Thorsen house; west of the Cold Canal
MW-DN-124-I	Monitoring Well	10 feet south of the liquid nitrogen inerting tanks
MW-DN-124-S	Monitoring Well	10 feet south of the liquid nitrogen inerting tanks
MW-DN-125-S	Monitoring Well	40 feet east of 2/3 B CST
MW-DN-126-S	Monitoring Well	15 feet south of fence around Unit 2/3 A CST and B CST (outside of fence)
MW-DN-127-S	Monitoring Well	20 feet south of Unit 3 HRSS
MW-DN-134-S	Monitoring Well	20-ft North of Mausoleum Building
MW-DN-135-S	Monitoring Well	20-ft East of Mausoleum Building
MW-DN-136-S	Monitoring Well	14.5-ft South of Mausoleum Building
MW-DN-137-S	Monitoring Well	20-ft West of Mausoleum Building
MW-DN-140-S	Monitoring Well	East of MW-DN-104S at SW corner outside of 2/3 crib house
MW-DN-141-S	Monitoring Well	North of 'A' Waste Tank next to 2/3 main chimney
MD-11	Sample Location	Piping located between Condensate Storage Tanks.
DSP-131	Surface Water	Storm water – 35 ft NE of the Unit 2/3 heating boiler 150,000 gallon diesel fuel storage tank 15 ft W of the hot canal fence – underneath Security Block
DSP-132	Surface Water	Storm water – 150 ft NE of the Unit 1 Sphere. The sewer is in the middle of the road with a solid cover (no slots). There are two other sewers in the vicinity with solid covers on them, but both have the word "SANITARY" on the cover. The sewer is 66 ft SE of the Unit 1 diesel fuel transfer shed.
DSP-133	Surface Water	Storm water ditch north of Pre-Access Facility
SW-DN-101	Surface Water	Unit 2/3 Intake (DSP50) at the Ross Bridge
SW-DN-102	Surface Water	Unit 2/3 Discharge (DSP20) at the Telemetry Bridge
SW-DN-103	Surface Water	Unit 2/3 Return Canal at the Discharge to the Intake Canal
SW-DN-104	Surface Water	Cold Canal (DSP34A) at the Cooling Tower walkway bridge
SW-DN-105	Surface Water	Hot Canal (DSP34B) at the Cooling Tower walkway bridge
SW-DN-106	Surface Water	Cooling Pond - Pool II at the east side of the Covered Bridge
2/3 Discharge Hot Canal Level	Surface Water	2/3 Discharge Hot Canal Headworks
2/3 Cribhouse Cold Canal Level	Surface Water	2/3 Cribhouse
Unit 1 Cribhouse Intake Level	Surface Water	Unit 1 Cribhouse
FW-1	Precipitation	40 feet southwest of Unit 2/3 Off-gas Filter Building access door; north end of guardrail
FW-10	Precipitation	At the fence at the northwest corner of the SBO Building
FW-11	Precipitation	30 feet east of the east wall of the EM shop; at the stanchion for RGPP well DSP-105
FW-12	Precipitation	60 feet southeast of the southwest corner of the Admin Building; on the security fence

APPENDIX B

DATA TABLES

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TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
DSP-105	03/05/19		225 ± 130						
DSP-105	05/29/19		261 ± 126	< 6.2	< 0.8	< 1.4	< 1.4	3.3 ± 1.1	< 1.7
DSP-105	08/27/19		< 188						
DSP-105	12/11/19		< 189						
DSP-106	03/05/19		1450 ± 217						
DSP-106	03/05/19	*NP*	1790 ± 247						
DSP-106	05/29/19		1600 ± 223	< 6.8	< 0.8	< 1.1	< 4.3	3.3 ± 1.1	< 3.6
DSP-106	05/29/19	*NP*	1380 ± 204						
DSP-106	08/27/19		1390 ± 209						
DSP-106	08/27/19	*NP*	1410 ± 211						
DSP-106	12/11/19		1310 ± 204						
DSP-106	12/11/19	*NP*	1530 ± 223						
DSP-107	03/05/19		1960 ± 263						
DSP-107	03/05/19	*NP*	1940 ± 262						
DSP-107	05/28/19		1750 ± 234	< 8.7	< 0.7	< 1.2	< 0.9	4.3 ± 1.1	< 1.5
DSP-107	05/28/19	*NP*	1820 ± 245						
DSP-107	08/27/19		1780 ± 247						
DSP-107	08/27/19	*NP*	1950 ± 264						
DSP-107	12/10/19		1880 ± 257						
DSP-107	12/10/19	*NP*	1930 ± 262						
DSP-108	03/05/19		426 ± 137						
DSP-108	05/28/19		414 ± 133	< 5.9	2.6 ± 0.8	**< 3.2**	< 0.9	10.9 ± 1.7	< 1.5
DSP-108	05/28/19	*Reanalysis*			2.0 ± 0.6				
DSP-108	08/27/19		364 ± 133						
DSP-108	12/10/19		336 ± 131						
DSP-122	03/04/19		527 ± 144						
DSP-122	05/28/19		502 ± 140						
DSP-122	08/26/19		330 ± 132						
DSP-122	12/09/19		454 ± 137						
DSP-123	03/05/19		531 ± 145						
DSP-123	05/28/19		489 ± 136	< 3.5	< 0.6	< 2.0	< 0.7	7.6 ± 1.4	< 1.6
DSP-123	08/27/19		308 ± 130						
DSP-123	12/10/19		319 ± 131						
DSP-124	03/07/19		642 ± 146						
DSP-124	05/30/19		822 ± 153						
DSP-124	08/29/19		847 ± 161						
DSP-124	12/12/19		450 ± 139						
DSP-125	03/06/19		357 ± 136						
DSP-125	05/29/19		269 ± 126	< 5.9	< 0.7	**< 9.6**	3.7 ± 1.0	15.6 ± 3.9	4.1 ± 1.4
DSP-125	08/28/19		227 ± 123						
DSP-125	12/12/19		< 191						
DSP-126	05/27/19		< 186						
DSP-131	03/07/19		312 ± 130						
DSP-131	05/30/19		730 ± 149						
DSP-131	08/26/19		632 ± 144						
DSP-131	12/09/19		854 ± 162						
DSP-132	03/07/19		334 ± 134						
DSP-132	05/30/19		< 197						
DSP-132	08/27/19		558 ± 142						
DSP-132	12/09/19		526 ± 142						
DSP-133	03/02/19		< 190						
DSP-133	05/30/19		< 198						
DSP-133	08/28/19		< 189						
DSP-133	12/12/19		< 190						
DSP-147	05/27/19		< 196						
DSP-148	03/02/19		252 ± 129						
DSP-148	05/25/19		< 194						
DSP-148	08/24/19		268 ± 130						
DSP-148	12/07/19		< 191						

***BOLD** values = Unable to meet detection limits due to high solids content*

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
DSP-149R	03/02/19		367 ± 136						
DSP-149R	05/25/19		379 ± 138						
DSP-149R	08/24/19		349 ± 133						
DSP-149R	12/07/19		359 ± 134						
DSP-150	03/05/19		< 194						
DSP-150	05/29/19		< 195						
DSP-150	08/28/19		< 195						
DSP-150	12/11/19		< 192						
DSP-151	03/05/19		< 196						
DSP-151	05/29/19		< 198						
DSP-151	08/28/19		< 194						
DSP-151	12/10/19		< 195						
DSP-154	05/27/19		< 200						
DSP-156	03/02/19		< 196						
DSP-156	05/25/19		< 196						
DSP-156	08/24/19		< 194						
DSP-156	12/07/19		< 194						
DSP-157-I	05/27/19		< 198						
DSP-157-S	05/27/19		< 194						
DSP-159-I	05/27/19		285 ± 131						
DSP-159-S	05/27/19		< 197						
MD-11	03/06/19		29300 ± 2980						
MD-11	03/06/19	*NP*	28900 ± 2940						
MD-11	05/29/19		40200 ± 4060	< 4.5	< 0.8	< 1.0	< 0.9	14.1 ± 1.4	< 1.5
MD-11	05/29/19	*NP*	37800 ± 3830						
MD-11	08/28/19		40700 ± 4130						
MD-11	08/28/19	*NP*	37400 ± 3800						
MD-11	12/12/19		33400 ± 3390	< 4.1	< 0.5	< 1.6	< 0.6	23.1 ± 1.6	< 1.5
MD-11	12/12/19	*NP*	31800 ± 3230						
MW-DN-101-I	03/05/19		448 ± 139	< 2.7	< 0.5				
MW-DN-101-I	05/28/19		388 ± 136	< 7.2	< 0.8	< 1.9	< 0.7	9.7 ± 1.5	< 1.6
MW-DN-101-I	08/27/19		373 ± 135	< 5.5	< 0.9				
MW-DN-101-I	12/10/19		399 ± 138	< 7.5	< 0.7				
MW-DN-101-S	03/05/19		< 190						
MW-DN-101-S	05/28/19		< 197	< 6.3	< 0.9	**< 3.3**	3.8 ± 1.5	**< 5.7**	< 3.8
MW-DN-101-S	08/27/19		< 189						
MW-DN-101-S	12/10/19		< 193						
MW-DN-102-I	03/06/19		< 196						
MW-DN-102-I	05/29/19		< 198	< 6.1	< 0.9	< 0.8	< 0.8	47.5 ± 2.0	< 1.7
MW-DN-102-I	08/29/19		< 191						
MW-DN-102-I	12/11/19		< 192						
MW-DN-102-S	03/06/19		< 195						
MW-DN-102-S	05/29/19		< 196	< 5.5	< 0.8	**< 14.2**	5.2 ± 2.7	37.0 ± 11.5	**< 7.7**
MW-DN-102-S	08/29/19		< 191						
MW-DN-102-S	12/11/19		< 190						
MW-DN-103-I	05/27/19		< 198						
MW-DN-103-S	05/27/19		< 193						
MW-DN-104-S	03/04/19		< 191						
MW-DN-104-S	05/28/19		< 197						
MW-DN-104-S	08/26/19		238 ± 131						
MW-DN-104-S	12/09/19		< 194						
MW-DN-105-S	03/05/19		< 190	< 9.1	< 0.8				
MW-DN-105-S	05/29/19		246 ± 129	< 6.7	2.4 ± 0.7				
MW-DN-105-S	08/28/19		218 ± 128	< 3.4	2.1 ± 0.7				
MW-DN-105-S	12/10/19		315 ± 132	< 4.5	1.9 ± 0.4				
MW-DN-106-S	05/27/19		< 193						
MW-DN-107-S	03/06/19		1580 ± 225						
MW-DN-107-S	05/29/19		< 190						
MW-DN-107-S	08/28/19		1260 ± 203						

***BOLD** values = Unable to meet detection limits due to high solids content*

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-DN-107-S	12/11/19		1340 ± 210						
MW-DN-109-I	03/04/19		440 ± 138						
MW-DN-109-I	05/28/19		615 ± 145	< 5.3	< 0.7	**< 3.7**	< 1.5	11.1 ± 4.0	< 3.5
MW-DN-109-I	08/26/19		451 ± 138						
MW-DN-109-I	12/09/19		467 ± 141						
MW-DN-109-S	03/04/19		< 193						
MW-DN-109-S	05/28/19		< 196	< 8.0	< 0.6	**< 5.2**	< 1.5	21.0 ± 5.3	< 3.5
MW-DN-109-S	08/26/19		< 193						
MW-DN-109-S	12/09/19		< 194						
MW-DN-110-I	03/04/19		274 ± 131						
MW-DN-110-I	05/28/19		< 191						
MW-DN-110-I	08/26/19		< 191						
MW-DN-110-I	12/09/19		< 196						
MW-DN-110-S	03/04/19		< 193						
MW-DN-110-S	05/28/19		< 193						
MW-DN-110-S	08/26/19		< 193						
MW-DN-110-S	12/09/19		< 195						
MW-DN-111-S	03/07/19		584 ± 147						
MW-DN-111-S	05/30/19		481 ± 142						
MW-DN-111-S	08/29/19		300 ± 130						
MW-DN-111-S	12/12/19		1390 ± 214						
MW-DN-112-I	03/04/19		< 191						
MW-DN-112-I	05/30/19		< 192						
MW-DN-112-I	08/26/19		< 196						
MW-DN-112-I	12/09/19		< 197						
MW-DN-112-S	03/04/19		< 194						
MW-DN-112-S	05/30/19		< 194						
MW-DN-112-S	08/26/19		< 193						
MW-DN-112-S	12/09/19		< 190						
MW-DN-113-I	03/06/19		< 190						
MW-DN-113-I	05/29/19		< 197	< 7.3	< 0.6	< 3.0	7.3 ± 2.0	7.9 ± 3.4	11.6 ± 2.7
MW-DN-113-I	08/29/19		< 195						
MW-DN-113-I	12/11/19		< 194						
MW-DN-113-S	03/06/19		< 189						
MW-DN-113-S	05/29/19		< 197	< 6.1	< 0.6	< 1.7	1.9 ± 0.4	4.4 ± 2.4	3.0 ± 0.6
MW-DN-113-S	08/29/19		< 195						
MW-DN-113-S	12/11/19		< 193						
MW-DN-114-I	03/06/19		4500 ± 507						
MW-DN-114-I	03/06/19	*NP*	6730 ± 731						
MW-DN-114-I	05/29/19		383 ± 138						
MW-DN-114-I	05/29/19	*NP*	4350 ± 494						
MW-DN-114-I	08/28/19		706 ± 155						
MW-DN-114-I	08/28/19	*NP*	308 ± 130						
MW-DN-114-I	12/12/19		4160 ± 479						
MW-DN-114-I	12/12/19	*NP*	981 ± 177						
MW-DN-114-S	03/06/19		2020 ± 267						
MW-DN-114-S	03/06/19	*NP*	1650 ± 235						
MW-DN-114-S	05/29/19		3990 ± 460						
MW-DN-114-S	05/29/19	*NP*	2140 ± 281						
MW-DN-114-S	08/28/19		< 195						
MW-DN-114-S	08/28/19	*NP*	< 196						
MW-DN-114-S	12/12/19		< 195						
MW-DN-114-S	12/12/19	*NP*	< 194						
MW-DN-115-I	03/06/19		427 ± 136						
MW-DN-115-I	05/29/19		373 ± 136						
MW-DN-115-I	08/28/19		324 ± 134						
MW-DN-115-I	12/11/19		436 ± 138						
MW-DN-115-S	03/06/19		< 195						
MW-DN-115-S	05/29/19		< 191						

***BOLD** values = Unable to meet detection limits due to high solids content*

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-DN-115-S	08/28/19		< 193						
MW-DN-115-S	12/11/19		< 195						
MW-DN-116-I	03/04/19		< 193						
MW-DN-116-I	03/04/19	*NP*	< 192						
MW-DN-116-I	05/28/19		< 195	< 6.9	< 0.9	< 2.7	< 0.7	15.6 ± 1.8	< 1.6
MW-DN-116-I	05/28/19	*NP*	< 195						
MW-DN-116-I	08/26/19		< 194						
MW-DN-116-I	08/26/19	*NP*	< 193						
MW-DN-116-I	12/09/19		< 194						
MW-DN-116-I	12/09/19	*NP*	< 195						
MW-DN-116-S	03/04/19		225 ± 130						
MW-DN-116-S	05/28/19		< 193	< 6.2	< 0.6	< 2.1	< 0.7	13.4 ± 1.6	< 1.6
MW-DN-116-S	08/26/19		< 195						
MW-DN-116-S	12/10/19		< 194						
MW-DN-117-I	03/05/19		< 194						
MW-DN-117-I	05/28/19		< 193						
MW-DN-117-I	08/27/19		< 197						
MW-DN-117-I	12/10/19		< 196	< 8.0	< 0.4	< 1.1	< 1.2	1.7 ± 0.8	< 1.6
MW-DN-118-S	03/05/19		< 188						
MW-DN-118-S	05/28/19		< 194	< 6.4	< 0.8	< 1.1	< 0.9	5.6 ± 1.1	< 1.5
MW-DN-118-S	08/27/19		< 199						
MW-DN-118-S	12/10/19		< 199						
MW-DN-119-I	03/05/19		< 192	< 4.3	< 0.8				
MW-DN-119-I	05/28/19		< 193	< 5.5	< 0.8	< 2.2	< 1.5	19.3 ± 2.3	< 2.5
MW-DN-119-I	08/27/19		< 194	< 3.7	< 1.0				
MW-DN-119-I	12/10/19		< 192	< 7.4	< 0.4	**< 3.3**	< 1.0	30.2 ± 3.2	< 2.5
MW-DN-119-S	03/05/19		< 193						
MW-DN-119-S	05/28/19		< 195	< 9.7	< 0.8	< 3.0	5.5 ± 2.0	9.2 ± 1.6	10.2 ± 1.8
MW-DN-119-S	08/27/19		< 192						
MW-DN-119-S	12/10/19		< 194						
MW-DN-122-I	05/27/19		< 190						
MW-DN-122-S	05/27/19		< 192						
MW-DN-124-I	03/06/19		21100 ± 2160						
MW-DN-124-I	03/06/19	*NP*	22300 ± 2280						
MW-DN-124-I	05/30/19		21300 ± 2180	< 6.2	< 0.7	**< 4.2**	< 1.5	78.6 ± 6.6	< 3.5
MW-DN-124-I	05/30/19	*NP*	20400 ± 2090						
MW-DN-124-I	08/29/19		19800 ± 2040						
MW-DN-124-I	08/29/19	*NP*	22800 ± 2330						
MW-DN-124-I	12/12/19		19600 ± 2000						
MW-DN-124-I	12/12/19	*NP*	20300 ± 2090						
MW-DN-124-S	03/06/19		3220 ± 383						
MW-DN-124-S	03/06/19	*NP*	2730 ± 336						
MW-DN-124-S	05/30/19		5760 ± 636	< 6.6	< 0.8	< 3.0	< 1.0	34.4 ± 5.6	< 3.8
MW-DN-124-S	05/30/19	*NP*	3900 ± 452						
MW-DN-124-S	08/29/19		3620 ± 430						
MW-DN-124-S	08/29/19	*NP*	4500 ± 504						
MW-DN-124-S	12/12/19		286 ± 132						
MW-DN-124-S	12/12/19	*NP*	530 ± 142						
MW-DN-125-S	03/07/19		< 191						
MW-DN-125-S	05/30/19		< 190	< 9.5	< 0.8	< 1.6	< 1.4	5.8 ± 2.5	< 3.5
MW-DN-125-S	08/29/19		< 198						
MW-DN-125-S	12/12/19		< 191						
MW-DN-126-S	03/06/19		1570 ± 227						
MW-DN-126-S	05/29/19		280 ± 131	< 6.0	< 0.8	**< 3.5**	2.6 ± 1.4	**< 5.5**	5.0 ± 2.4
MW-DN-126-S	08/28/19		< 198						
MW-DN-126-S	12/11/19		< 189						
MW-DN-127-S	03/06/19		< 189						
MW-DN-127-S	05/29/19		315 ± 132	< 7.1	< 0.8	< 0.4	< 1.1	1.8 ± 0.6	2.9 ± 1.3
MW-DN-127-S	08/28/19		< 197						

BOLD values = Unable to meet detection limits due to high solids content

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-DN-127-S	12/11/19		< 186						
MW-DN-134-S	03/02/19		< 195						
MW-DN-134-S	05/27/19		< 193	< 6.1	< 0.9	2.2 ± 1.3	< 0.9	7.9 ± 1.3	< 1.5
MW-DN-134-S	08/24/19		< 191						
MW-DN-134-S	12/07/19		< 191						
MW-DN-135-S	03/02/19		< 195						
MW-DN-135-S	05/27/19		< 191	< 7.7	< 0.9	2.7 ± 1.3	< 0.9	6.8 ± 1.2	< 1.5
MW-DN-135-S	08/24/19		< 195						
MW-DN-135-S	12/07/19		< 184						
MW-DN-136-S	03/02/19		< 192						
MW-DN-136-S	05/27/19		< 192	< 6.0	< 0.8	8.8 ± 3.6	< 1.4	10.4 ± 3.9	< 3.5
MW-DN-136-S	08/24/19		< 192						
MW-DN-136-S	12/07/19		< 188						
MW-DN-137-S	03/02/19		< 192						
MW-DN-137-S	05/27/19		< 192	< 6.8	< 0.7	< 2.9	< 1.4	8.6 ± 3.4	< 3.5
MW-DN-137-S	08/24/19		< 194						
MW-DN-137-S	12/07/19		< 188						
MW-DN-140-S	03/04/19		213 ± 128						
MW-DN-140-S	03/04/19	*NP*	284 ± 134						
MW-DN-140-S	05/28/19		272 ± 131						
MW-DN-140-S	05/28/19	*NP*	211 ± 129						
MW-DN-140-S	08/26/19		337 ± 133						
MW-DN-140-S	08/26/19	*NP*	< 192						
MW-DN-140-S	12/09/19		< 185						
MW-DN-140-S	12/09/19	*NP*	< 187						
MW-DN-141-S	03/04/19		609 ± 150						
MW-DN-141-S	03/04/19	*NP*	478 ± 143						
MW-DN-141-S	05/28/19		1080 ± 180	< 7.9	< 0.8	< 0.9	< 0.9	19.8 ± 1.5	< 1.5
MW-DN-141-S	05/28/19	*NP*	939 ± 168						
MW-DN-141-S	08/26/19		792 ± 162						
MW-DN-141-S	08/26/19	*NP*	1170 ± 194						
MW-DN-141-S	12/09/19		1380 ± 207						
MW-DN-141-S	12/09/19	*NP*	1520 ± 221						
MW-DN-142-S	03/02/19		< 191						
MW-DN-142-S	05/27/19		< 189	< 8.5	< 0.8	**< 3.7**	< 1.4	14.3 ± 4.1	< 3.5
MW-DN-142-S	08/24/19		< 196						
MW-DN-142-S	12/07/19		< 187						
MW-DN-143-S	03/02/19		< 191						
MW-DN-143-S	05/27/19		< 189	< 6.7	< 0.9	< 2.5	< 1.0	9.9 ± 4.1	< 3.8
MW-DN-143-S	08/24/19		< 183						
MW-DN-143-S	12/07/19		< 187						
MW-DN-144-S	03/02/19		< 192						
MW-DN-144-S	05/27/19		< 187	< 9.7	< 0.8	< 2.4	< 1.0	8.0 ± 4.0	< 3.8
MW-DN-144-S	08/24/19		< 196						
MW-DN-144-S	12/07/19		< 187						

***BOLD** values = Unable to meet detection limits due to high solids content*

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
DSP-105	03/05/19	< 56	< 51	< 7	< 7	< 15	< 7	< 15	< 7	< 12	< 13	< 8	< 7	< 35	< 8
DSP-105	05/29/19	< 54	< 101	< 5	< 7	< 15	< 10	< 13	< 7	< 12	< 11	< 6	< 6	< 36	< 14
DSP-105	08/27/19	< 66	< 95	< 6	< 6	< 14	< 9	< 13	< 8	< 13	< 14	< 8	< 8	< 35	< 14
DSP-105	12/11/19	< 52	< 97	< 3	< 6	< 13	< 4	< 11	< 7	< 9	< 10	< 6	< 7	< 28	< 10
DSP-106	03/05/19	< 50	137 ± 53	< 7	< 7	< 10	< 7	< 12	< 6	< 13	< 13	< 7	< 7	< 31	< 8
DSP-106	05/29/19	< 55	< 62	< 7	< 6	< 11	< 5	< 11	< 7	< 12	< 14	< 7	< 7	< 40	< 14
DSP-106	08/27/19	< 54	< 95	< 7	< 5	< 13	< 7	< 11	< 7	< 10	< 13	< 5	< 6	< 25	< 14
DSP-106	12/11/19	< 49	< 120	< 6	< 7	< 11	< 10	< 12	< 7	< 10	< 10	< 9	< 6	< 30	< 10
DSP-107	03/05/19	< 46	< 61	< 5	< 5	< 7	< 5	< 9	< 6	< 8	< 9	< 6	< 5	< 26	< 10
DSP-107	05/28/19	< 59	< 87	< 7	< 6	< 17	< 7	< 13	< 7	< 15	< 14	< 8	< 8	< 39	< 12
DSP-107	08/27/19	< 49	< 131	< 5	< 5	< 13	< 5	< 12	< 7	< 11	< 13	< 6	< 6	< 34	< 11
DSP-107	12/10/19	< 47	< 122	< 5	< 7	< 11	< 5	< 11	< 7	< 11	< 12	< 7	< 6	< 28	< 13
DSP-108	03/05/19	< 47	< 97	< 7	< 7	< 13	< 5	< 9	< 5	< 9	< 10	< 6	< 6	< 35	< 10
DSP-108	05/28/19	< 51	< 88	< 4	< 6	< 12	< 6	< 11	< 5	< 9	< 13	< 6	< 6	< 34	< 11
DSP-108	08/27/19	< 50	< 138	< 5	< 5	< 14	< 6	< 13	< 7	< 10	< 14	< 7	< 6	< 35	< 12
DSP-108	12/10/19	< 48	< 106	< 5	< 6	< 17	< 6	< 15	< 8	< 16	< 13	< 6	< 8	< 33	< 14
DSP-123	03/05/19	< 49	< 92	< 5	< 4	< 12	< 7	< 13	< 6	< 8	< 10	< 5	< 4	< 25	< 9
DSP-123	05/28/19	< 54	< 104	< 5	< 6	< 10	< 7	< 13	< 8	< 13	< 14	< 6	< 6	< 34	< 9
DSP-123	08/27/19	< 47	< 103	< 5	< 5	< 13	< 7	< 9	< 6	< 7	< 12	< 6	< 6	< 30	< 6
DSP-123	12/10/19	< 61	< 113	< 6	< 8	< 12	< 9	< 14	< 6	< 11	< 10	< 8	< 6	< 37	< 9
DSP-125	05/29/19	< 65	< 78	< 7	< 6	< 13	< 6	< 13	< 8	< 14	< 14	< 9	< 7	< 37	< 13
DSP-126	05/27/19	< 50	< 75	< 5	< 7	< 13	< 6	< 10	< 7	< 9	< 15	< 6	< 5	< 36	< 10
DSP-131	05/30/19	< 62	< 130	< 8	< 8	< 15	< 5	< 9	< 7	< 13	< 10	< 5	< 7	< 32	< 10
DSP-132	05/30/19	< 65	< 57	< 5	< 6	< 12	< 9	< 13	< 8	< 10	< 12	< 7	< 7	< 29	< 7
DSP-133	05/30/19	< 71	< 122	< 8	< 8	< 14	< 7	< 14	< 7	< 13	< 15	< 6	< 7	< 32	< 6
DSP-147	05/27/19	< 61	< 67	< 6	< 6	< 14	< 7	< 15	< 8	< 13	< 13	< 7	< 7	< 34	< 12
DSP-154	05/27/19	< 41	< 90	< 5	< 5	< 9	< 6	< 9	< 5	< 9	< 13	< 6	< 6	< 30	< 9
DSP-157-I	05/27/19	< 39	< 51	< 5	< 5	< 10	< 6	< 10	< 4	< 7	< 11	< 6	< 5	< 28	< 11
DSP-157-S	05/27/19	< 45	< 111	< 4	< 4	< 10	< 4	< 9	< 4	< 8	< 10	< 5	< 5	< 23	< 8
DSP-159-I	05/27/19	< 65	< 52	< 6	< 6	< 15	< 5	< 16	< 7	< 12	< 13	< 6	< 7	< 36	< 13
DSP-159-S	05/27/19	< 53	< 103	< 4	< 5	< 10	< 7	< 10	< 7	< 7	< 13	< 7	< 6	< 31	< 9
MD-11	05/29/19	< 56	< 68	< 6	< 6	< 13	< 8	< 10	< 7	< 10	< 13	< 8	< 6	< 30	< 9
MD-11	12/12/19	< 71	< 67	< 6	< 9	< 15	< 5	< 14	< 8	< 13	< 12	< 10	< 7	< 38	< 14
MW-DN-101-I	03/05/19	< 76	< 71	< 7	< 7	< 14	< 9	< 15	< 7	< 12	< 14	< 7	< 7	< 35	< 10
MW-DN-101-I	05/28/19	< 60	< 105	< 6	< 9	< 15	< 5	< 15	< 7	< 12	< 15	< 7	< 7	< 35	< 13
MW-DN-101-I	08/27/19	< 52	< 144	< 6	< 6	< 12	< 7	< 12	< 8	< 12	< 14	< 8	< 7	< 30	< 14
MW-DN-101-I	12/10/19	< 59	< 83	< 5	< 6	< 14	< 8	< 13	< 7	< 11	< 12	< 6	< 6	< 30	< 12
MW-DN-101-S	03/05/19	< 55	< 125	< 7	< 5	< 13	< 5	< 9	< 8	< 12	< 12	< 7	< 6	< 33	< 9
MW-DN-101-S	05/28/19	< 56	< 99	< 7	< 5	< 17	< 5	< 11	< 7	< 10	< 14	< 7	< 6	< 41	< 10

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
MW-DN-101-S	08/27/19	< 48	< 104	< 6	< 5	< 13	< 7	< 9	< 6	< 8	< 14	< 5	< 6	< 30	< 12
MW-DN-101-S	12/10/19	< 68	< 75	< 7	< 8	< 17	< 6	< 16	< 8	< 13	< 13	< 8	< 6	< 36	< 14
MW-DN-102-I	05/29/19	< 57	< 70	< 6	< 6	< 15	< 6	< 10	< 8	< 13	< 13	< 8	< 6	< 31	< 11
MW-DN-102-S	05/29/19	< 61	< 54	< 5	< 6	< 15	< 6	< 15	< 6	< 13	< 11	< 7	< 6	< 31	< 11
MW-DN-103-I	05/27/19	< 46	< 55	< 4	< 4	< 9	< 4	< 9	< 4	< 7	< 9	< 5	< 4	< 25	< 10
MW-DN-103-S	05/27/19	< 44	< 39	< 5	< 5	< 10	< 5	< 7	< 6	< 9	< 12	< 6	< 5	< 31	< 11
MW-DN-106-S	05/27/19	< 48	< 54	< 6	< 5	< 10	< 6	< 9	< 5	< 9	< 13	< 6	< 6	< 31	< 9
MW-DN-109-I	05/28/19	< 47	< 142	< 2	< 4	< 11	< 6	< 13	< 6	< 9	< 11	< 6	< 6	< 32	< 11
MW-DN-109-S	05/28/19	< 42	< 92	< 6	< 5	< 11	< 8	< 12	< 6	< 12	< 14	< 6	< 5	< 27	< 11
MW-DN-113-I	05/29/19	< 60	< 130	< 7	< 6	< 12	< 5	< 15	< 8	< 14	< 14	< 7	< 7	< 43	< 5
MW-DN-113-S	05/29/19	< 68	< 65	< 5	< 6	< 13	< 7	< 9	< 7	< 11	< 14	< 7	< 7	< 33	< 13
MW-DN-116-I	03/04/19	< 50	< 115	< 5	< 6	< 12	< 4	< 13	< 7	< 10	< 12	< 6	< 5	< 29	< 10
MW-DN-116-I	05/28/19	< 67	< 98	< 6	< 7	< 14	< 5	< 15	< 5	< 10	< 11	< 7	< 8	< 39	< 11
MW-DN-116-I	08/26/19	< 45	< 45	< 5	< 6	< 13	< 6	< 11	< 6	< 10	< 12	< 6	< 5	< 30	< 12
MW-DN-116-I	12/09/19	< 28	57 ± 38	< 3	< 3	< 6	< 3	< 6	< 3	< 5	< 6	< 4	< 3	< 17	< 6
MW-DN-116-S	03/04/19	< 40	< 74	< 4	< 7	< 9	< 8	< 13	< 5	< 10	< 13	< 7	< 4	< 26	< 11
MW-DN-116-S	05/28/19	< 48	< 106	< 6	< 6	< 10	< 6	< 11	< 6	< 10	< 14	< 5	< 6	< 25	< 10
MW-DN-116-S	08/26/19	< 51	< 133	< 7	< 7	< 15	< 6	< 11	< 7	< 11	< 13	< 6	< 5	< 42	< 15
MW-DN-116-S	12/10/19	< 63	< 113	< 6	< 6	< 13	< 5	< 13	< 8	< 11	< 15	< 7	< 6	< 33	< 7
MW-DN-117-I	03/05/19	< 55	< 118	< 6	< 6	< 14	< 7	< 10	< 6	< 10	< 13	< 6	< 8	< 29	< 14
MW-DN-117-I	05/28/19	< 36	< 135	< 4	< 5	< 11	< 6	< 10	< 6	< 7	< 12	< 6	< 6	< 27	< 10
MW-DN-117-I	08/27/19	< 62	< 112	< 6	< 6	< 11	< 5	< 12	< 7	< 10	< 15	< 6	< 6	< 30	< 11
MW-DN-117-I	12/10/19	< 63	< 109	< 5	< 6	< 11	< 6	< 13	< 7	< 11	< 11	< 6	< 6	< 35	< 9
MW-DN-118-S	03/05/19	< 66	< 123	< 6	< 7	< 12	< 8	< 14	< 7	< 12	< 12	< 8	< 6	< 34	< 9
MW-DN-118-S	05/28/19	< 54	< 133	< 5	< 6	< 12	< 6	< 11	< 5	< 10	< 11	< 5	< 5	< 33	< 6
MW-DN-118-S	08/27/19	< 39	< 97	< 7	< 6	< 10	< 8	< 14	< 8	< 10	< 12	< 6	< 6	< 28	< 13
MW-DN-118-S	12/10/19	< 64	< 159	< 6	< 8	< 18	< 9	< 15	< 8	< 11	< 14	< 9	< 7	< 34	< 13
MW-DN-119-I	05/28/19	< 53	< 144	< 5	< 5	< 14	< 3	< 13	< 5	< 11	< 14	< 6	< 6	< 25	< 12
MW-DN-119-I	12/10/19	< 53	< 108	< 7	< 5	< 14	< 7	< 14	< 8	< 10	< 11	< 8	< 5	< 32	< 13
MW-DN-119-S	05/28/19	< 57	< 134	< 5	< 6	< 15	< 5	< 14	< 6	< 14	< 12	< 7	< 6	< 35	< 5
MW-DN-122-I	05/27/19	< 49	< 105	< 5	< 7	< 14	< 7	< 11	< 7	< 10	< 15	< 7	< 6	< 36	< 9
MW-DN-122-S	05/27/19	< 67	< 120	< 6	< 6	< 16	< 6	< 14	< 8	< 10	< 14	< 7	< 9	< 41	< 14
MW-DN-124-I	05/30/19	< 59	< 130	< 6	< 7	< 14	< 8	< 13	< 8	< 13	< 13	< 7	< 7	< 35	< 11
MW-DN-124-I	12/12/19	< 62	< 136	< 8	< 8	< 13	< 7	< 12	< 7	< 11	< 12	< 7	< 6	< 31	< 13
MW-DN-124-S	05/30/19	< 70	< 122	< 6	< 7	< 14	< 7	< 15	< 5	< 10	< 13	< 7	< 5	< 31	< 8
MW-DN-124-S	12/12/19	< 63	< 109	< 9	< 8	< 14	< 8	< 12	< 9	< 12	< 14	< 7	< 7	< 40	< 13
MW-DN-125-S	05/30/19	< 51	< 116	< 6	< 7	< 13	< 7	< 10	< 6	< 10	< 12	< 6	< 5	< 30	< 9
MW-DN-126-S	05/29/19	< 56	< 130	< 6	< 5	< 11	< 6	< 8	< 6	< 9	< 12	< 6	< 7	< 30	< 9
MW-DN-127-S	05/29/19	< 59	< 82	< 7	< 7	< 11	< 6	< 11	< 6	< 14	< 11	< 8	< 5	< 39	< 9

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
MW-DN-134-S	05/27/19	< 55	< 134	< 6	< 7	< 13	< 10	< 14	< 7	< 13	< 15	< 6	< 6	< 40	< 10
MW-DN-135-S	05/27/19	< 54	< 30	< 6	< 6	< 9	< 4	< 9	< 6	< 10	< 13	< 6	< 4	< 38	< 12
MW-DN-136-S	05/27/19	< 49	< 55	< 6	< 5	< 10	< 5	< 11	< 5	< 9	< 13	< 6	< 5	< 32	< 10
MW-DN-137-S	05/27/19	< 47	< 42	< 6	< 7	< 13	< 5	< 16	< 6	< 11	< 13	< 6	< 7	< 28	< 12
MW-DN-141-S	05/28/19	< 57	< 111	< 5	< 4	< 13	< 6	< 13	< 5	< 12	< 15	< 6	< 5	< 30	< 12
MW-DN-142-S	05/27/19	< 57	< 89	< 7	< 6	< 14	< 7	< 14	< 8	< 12	< 13	< 8	< 6	< 40	< 9
MW-DN-143-S	05/27/19	< 49	< 99	< 5	< 7	< 12	< 6	< 10	< 6	< 10	< 11	< 6	< 6	< 33	< 9
MW-DN-144-S	05/27/19	< 60	< 118	< 8	< 6	< 13	< 8	< 15	< 7	< 12	< 15	< 6	< 6	< 41	< 12
MW-DN-135-S	06/20/18	< 49	< 91	< 5	< 5	< 14	< 6	< 13	< 7	< 9	< 12	< 6	< 6	< 31	< 10
MW-DN-136-S	06/20/18	< 66	< 167	< 8	< 8	< 16	< 7	< 16	< 8	< 10	< 15	< 8	< 6	< 44	< 15
MW-DN-137-S	06/20/18	< 61	< 57	< 8	< 8	< 15	< 8	< 14	< 7	< 11	< 14	< 9	< 7	< 31	< 14
MW-DN-141-S	06/14/18	< 46	< 30	< 5	< 5	< 11	< 5	< 9	< 5	< 9	< 15	< 5	< 5	< 35	< 11
MW-DN-142-S	06/20/18	< 68	< 92	< 6	< 8	< 17	< 9	< 14	< 7	< 15	< 13	< 8	< 10	< 39	< 12
MW-DN-143-S	06/20/18	< 55	< 115	< 5	< 6	< 14	< 4	< 11	< 5	< 9	< 11	< 6	< 6	< 32	< 8
MW-DN-144-S	06/20/18	< 80	< 184	< 9	< 9	< 18	< 10	< 19	< 9	< 13	< 14	< 9	< 9	< 38	< 9

TABLE B-I.3

CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-233/234	U-235	U-238	Fe-55	Ni-63
DSP-106	05/29/19									< 38	< 4.7
MD-11	05/29/19	< 0.05	< 0.02	< 0.06	< 0.03	< 0.17	< 0.05	< 0.02	< 0.06	< 74	< 4.6
MD-11	12/12/19	< 0.18	< 0.03	< 0.14	< 0.05	< 0.10	< 0.14	< 0.14	< 0.11	< 133	< 4.8
MW-DN-101-I	03/05/19	< 0.18	< 0.07	< 0.18	< 0.09	< 0.13	0.53 ± 0.19	< 0.04	0.22 ± 0.12	< 173	9.5 ± 2.6
MW-DN-101-I	05/28/19	< 0.07	< 0.03	< 0.06	< 0.10	< 0.07	0.45 ± 0.17	< 0.09	< 0.15	< 79	9.0 ± 3.0
MW-DN-101-I	08/27/19	< 0.11	< 0.02	< 0.13	< 0.11	< 0.18	0.28 ± 0.13	< 0.05	0.20 ± 0.11	< 89	7.2 ± 2.6
MW-DN-101-I	12/10/19	< 0.13	< 0.04	< 0.17	< 0.19	< 0.19	0.52 ± 0.23	< 0.08	< 0.12	< 79	11.6 ± 2.9
MW-DN-119-I	03/05/19	< 0.02	< 0.03	< 0.07	< 0.06	< 0.04	< 0.05	< 0.04	< 0.08	< 193	32.0 ± 3.0
MW-DN-119-I	05/28/19	< 0.03	< 0.03	< 0.02	< 0.20	< 0.15	< 0.10	< 0.04	< 0.08	< 85	18.2 ± 2.8
MW-DN-119-I	08/27/19	< 0.19	< 0.11	< 0.11	< 0.15	< 0.07	< 0.14	< 0.04	< 0.16	< 77	24.2 ± 3.4
MW-DN-119-I	12/10/19	< 0.07	< 0.02	< 0.08	< 0.09	< 0.16	< 0.17	< 0.12	< 0.14	< 105	21.9 ± 2.8
MW-DN-124-I	05/30/19	< 0.12	< 0.06	< 0.13	< 0.19	< 0.10	< 0.04	< 0.11	< 0.12	< 98	< 4.1
MW-DN-124-S	05/30/19	< 0.10	< 0.02	< 0.07	< 0.08	< 0.13	< 0.12	< 0.08	< 0.06	< 69	< 4.0

***BOLD** Value = Unable to meet detection limit due to high solds content*

TABLE B-II.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-DN-101	03/02/19	776 ± 155
SW-DN-101	05/25/19	< 187
SW-DN-101	08/24/19	787 ± 170
SW-DN-101	12/06/19	< 186
SW-DN-102	03/02/19	287 ± 134
SW-DN-102	05/25/19	312 ± 129
SW-DN-102	08/24/19	1460 ± 229
SW-DN-102	12/06/19	1130 ± 185
SW-DN-103	03/02/19	268 ± 132
SW-DN-103	05/25/19	227 ± 124
SW-DN-103	08/24/19	1080 ± 193
SW-DN-103	12/06/19	997 ± 172
SW-DN-104	03/02/19	331 ± 133
SW-DN-104	05/25/19	336 ± 129
SW-DN-104	08/24/19	1770 ± 257
SW-DN-104	12/06/19	1080 ± 181
SW-DN-105	03/02/19	404 ± 138
SW-DN-105	05/25/19	410 ± 133
SW-DN-105	08/24/19	497 ± 148
SW-DN-105	12/06/19	890 ± 163
SW-DN-106	03/02/19	341 ± 136
SW-DN-106	05/25/19	360 ± 127
SW-DN-106	08/24/19	1800 ± 259
SW-DN-106	12/06/19	1020 ± 174

TABLE B-II.2

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA .

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
SW-DN-101	05/25/19	< 54	< 119	< 5	< 7	< 19	< 5	< 17	< 8	< 16	< 13	< 7	< 9	< 45	< 13
SW-DN-102	05/25/19	< 39	< 51	< 5	< 6	< 10	< 7	< 7	< 5	< 9	< 13	< 5	< 5	< 26	< 8
SW-DN-103	05/25/19	< 43	< 45	< 4	< 5	< 11	< 5	< 9	< 5	< 9	< 12	< 5	< 5	< 31	< 11
SW-DN-104	05/25/19	< 39	< 35	< 4	< 6	< 9	< 5	< 10	< 5	< 9	< 12	< 5	< 4	< 32	< 10
SW-DN-105	05/25/19	< 55	< 47	< 5	< 5	< 14	< 6	< 11	< 7	< 8	< 13	< 6	< 6	< 27	< 13
SW-DN-106	05/25/19	< 46	< 40	< 4	< 5	< 10	< 5	< 9	< 5	< 9	< 12	< 5	< 5	< 29	< 6

TABLE B-III.1

CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED IN THE VICINITY OF DRESDEN NUCLEAR POWER STATION, 2019

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
FW-1	05/28/19	< 188
FW-10	05/28/19	< 181
FW-11	05/28/19	< 186
FW-12	05/28/19	< 187